No. 15-1715

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

JAMES S. CHIZMAR,

Plaintiff - Appellant

v.

ACCO BRANDS CORPORATION, STAPLES, INC.,

Defendants - Appellees

Appeal from the United States District Court for the Southern District of New York,
Case No. 1:14-cv-02181-PKC,
United States District Judge P. Kevin Castel.

NON-CONFIDENTIAL OPENING BRIEF OF PLAINITFF-APPELLANT JAMES S. CHIZMAR

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August 10, 2015

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT
JAMES CHIZMAR V. ACCO BRANDS CORP., 15-1715

CERTIFICATE OF INTEREST

Counsel for Appellant, James S. Chizmar, certifies the following:

1. The full name of every party represented by me is: James S. Chizmar

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is: None

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party represented by me are: None

4. The names of all law firms and partners or associates that appeared for the party now represented by me in the trial court or are expected to appear in this Court are:

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TABLE OF CONTENTS

CONFIDENTIAL MATERIAL OMITTED

Material designated as confidential by Defendant ACCO has been omitted from Chizmar's non-confidential opening brief. The material omitted on pages 25-26 describes structure and marketing of the accused products that has been designated as confidential by ACCO. The material omitted on page 27 (including figures) describes structure of the accused products designated as confidential by ACCO. The material omitted on page 28 describes structure and design strategies of the accused products designated as confidential by ACCO. The material omitted on pages 31-32 describes structure and design of the accused product designated as confidential by ACCO. The material omitted on pages 44-48 (including figures) describes structure and design of the accused product designated as confidential by ACCO. The material omitted on pages 55-56 (including figures) describes structure of the accused products designated as confidential by ACCO. The material omitted on page 68 describes information related to the person of ordinary skill designated as confidential by ACCO.

TABLE OF AUTHORITIES

Cases

Statutes

INDEX OF ABBREVIATIONS

Abbreviation	***Reference***
Chizmar	Plaintiff-Appellant James S. Chizmar
ACCO	Defendant-Appellee ACCO Brands Corporation
Staples	Defendant-Appellee Staples, Inc.
Defendants	ACCO and Staples
'140 Patent	U.S. Patent No. 8,277,140
'640 Patent	U.S. Patent No. 7,347,640
Patents-in-Suit	'140 and '640 Patents
Flex Binders	Defendants' accused Mead® Five Star Flex® products

STATEMENT OF RELATED CASES

There are no related cases as defined by Federal Circuit Rule 47.5.

PRELIMINARY STATEMENT

This case is about novel loose-leaf binders that can be opened 360 degrees. Prior art binders could not be opened 360 degrees and also provide a flat writing surface. Yet, to achieve a flat writing surface presents structural challenges in the design of the binder rings. The Patents-in-Suit solve these challenges with rings having specific structure that allow them to rotate or compress when the binder is open 360 degrees, thereby providing a flat writing surface.

The inventor and plaintiff, James S. Chizmar, asserted two of his patents against the Mead® Five Star Flex® binders sold by Defendants ACCO and Staples. There is no dispute that the accused Flex Binders were designed to meet similar goals and offer similar functionality described in Chizmar's patents.

This appeal follows an abbreviated proceeding in the District Court. There was no separate *Markman* hearing, and only a three-month discovery period limited exclusively to Defendants' proposed grounds for summary judgment.

In granting Defendants' motion for summary judgment, the District Court found no issues of fact warranted trial on either of the asserted patents. Yet, to reach that conclusion, the District Court overlooked key disclosures in the patents, misconstrued particularized testimony of a person of ordinary skill, and acknowledged that its construction of a claim term was a departure from that term's plain and ordinary meaning, despite the lack of lexicography or disavowal.

These errors warrant reversal of the summary judgment decision, and this case should proceed to full discovery and trial.

JURISDICTIONAL STATEMENT

This case was filed in the United States District Court for the Southern District of New York, which exercised jurisdiction over the case pursuant to 28 U.S.C. § 1338. On May 8, 2015, the District Court issued a Memorandum and Order granting summary judgment of invalidity of Claim 20 of '140 Patent and noninfringement of Claim 17 of the '640 Patent. On May 13, 2015, the District Court entered Judgment. (A0001). On June 4, 2015, the District Court so ordered the Joint Stipulation of Dismissal among the parties that dismissed all outstanding counterclaims. (A0026-27). Accordingly, this appeal is from a final judgment that disposes of all parties' claims. On June 8, 2015, the Notice of Appeal regarding the Memorandum and Order, the Judgment and the so ordered Joint Stipulation of Dismissal was timely filed. (A0296-298). This Court has jurisdiction of this appeal under 28 U.S.C. § 1295(a)(1). On July 17, 2015, the District Court denied Defendants' motion for attorneys' fees, and granted-in-part Defendants' request for a cost bond in the amount of $2000. (A0175). On August 3, 2015, Chizmar posted a $2000 bond for costs associated with his appeal. (A0299-1 – A0299-5).

STATEMENT OF THE ISSUES

1. Did the District Court err by finding that no issue of fact existed as to whether the accused Flex Binder rings infringe Claim 17 of the '640 Patent under the doctrine of equivalents?

2. Did the District Court err by construing the phrase "roughly-vertical column-like thick portions" in Claim 17 of the '640 Patent to require that the "column-like thick portions" must be on opposite sides of the ring?

3. Did the District Court err by finding that no issue of fact existed as to whether the '140 Patent can claim the benefit of the filing date of the '640 Patent on the ground that an "elastic pivot" was not adequately described in the '640 Patent?

STATEMENT OF THE CASE

On March 28, 2014, Plaintiff Chizmar filed a Complaint for patent infringement against Defendants ACCO and Staples. (A0200-206). The Complaint asserted infringement of two patents, the '140 Patent and the '640 Patent. (A0200, A0202-203). The accused products included Defendants' Mead® Five Star Flex® products (referred to herein as the "Flex Binders"). (A0202-203). The Complaint asserted infringement of at least claim 20 of the '140 Patent and at least claim 17 of the '640 Patent. (A0203).

In advance of the initial pre-trial conference before the District Court, Defendants notified the District Court that they contemplated filing a motion for summary judgment at the outset of the litigation on three separate grounds: (1) Claim 20 of the '140 Patent is invalid because the Flex Binders were being sold and offered for sale more than one year before the priority date of the '140 Patent; (2) Claim 17 of the '640 Patent is not infringed; and (3) Claim 17 of the '640 Patent is indefinite. (A0208-210).

After the District Court convened the initial pre-trial conference, (A0167), it ordered a discovery and briefing schedule for Defendants' proposed summary judgment motion. (A0211). The District Court ordered that the "parties may conduct discovery solely on the issues identified in defendants' proposed motion,

described in paragraph 2 of the parties July 1, 2014, letter (Docket # 22) until October 7, 2014" but otherwise, "[a]ll other discovery is stayed." (*Id.*).

The District Court also set a briefing schedule for Defendants' proposed summary judgment motion following the close of the abbreviated three-month discovery period. (*Id.*) (The schedule did not provide for separate expert discovery, and neither side relied upon third-party expert testimony during summary judgment.) In addition, the District Court ordered that there would not be a separate *Markman* hearing. Rather, "[a]ny issues of claim construction related to the motion may be addressed in the summary judgment submissions." (*Id.*).

The District Court held oral argument on two of the grounds on which Defendants moved for summary judgment, namely, the invalidity of Claim 20 of the '140 Patent and noninfringement of Claim 17 of the '640 Patent. (A0170). Following that, the District Court granted Defendants' motion for summary judgment on the grounds that Claim 20 of the '140 Patent was invalid, and Claim 17 of the '640 Patent was not infringed either literally or under the doctrine of equivalents. (A0002-25). Because the District Court found that Claim 17 of the '640 Patent was not infringed, it did not reach the issue of indefiniteness with respect to that claim. (*Id.*).

On May 13, 2015, the District Court entered Judgment in favor of Defendants. (A0001). On June 4, 2015, the District Court so ordered a Joint

Stipulation of Dismissal among the parties voluntarily dismissing ACCO's counterclaims, which were the only counterclaims asserted in this case. (A0026-A0027). On June 8, 2015, Chizmar filed and served his Notice of Appeal. (A0296-298). On July 17, 2015, the District Court denied Defendants' motion for attorneys' fees, and granted-in-part Defendants' request for a cost bond in the amount of $2000. (A0175). On August 3, 2015, Chizmar posted a $2000 bond for costs associated with his appeal. (A0299-1 – A0299-5).

STATEMENT OF FACTS

I. BACKGROUND OF THE INVENTIONS

A. Prior-art binders could not open 360 degrees while also providing a flat writing surface.

This case is about binders, namely, loose-leaf binders. Both binders and notebooks have long existed in the art. But binders and notebooks each have advantages as well as shortcomings that are not shared by the other. For instance, one of the primary advantages of a loose-leaf binder is that pages can be easily added and subtracted from the binder. By contrast, notebooks do not allow "the easy addition or removal of pages." (A0127 col. 1:35-39; A0061 col. 1:48-52). This inhibits their usefulness.

On the other hand, a problem that has plagued binders is that they "have a very large foot-print because, during use, the front cover is open 180 degrees relative to the back cover." (A0127 col. 1:41-42). This is not only "cumbersome," but if pages are flipped behind the back cover, then the loose-leaf pages "do not lie flat against the front and back covers" and "do[] not provide a flat writing surface." (A0127 col. 1:43-52; A0061 col. 1:56-64).

Having a binder that can open 360 degrees is unhelpful if it does not simultaneously offer the user a flat writing surface. For instance, when conventional prior-art binders are opened 360 degrees, "the skeleton creates an awkward lump, thwarting the object of a flat writing surface." (A0128 col. 3:3-4).

This can interfere with writing. "Large stress is exerted on some loose-leaves causing them to tear out of the binder" and rather than a flat writing surface, writing is difficult because the "stack of loose-leaves bends and springs back under the shifting weight of a writing hand and wrist." (A0127 col. 1:47-55). Unlike binders, however, notebooks easily allow "users to flip the front cover and forward pages perfectly flat beneath the back cover," thus minimizing the footprint and providing a flat-writing surface. (A0127 col. 1:35-37).

The Patents-in-Suit solve these limitations of traditional binders and notebooks. The patents are directed to binders that have the advantages of both a *binder* and a *notebook*. In particular, the patents claim a binder where the front cover can be "opened 180 or 360 degrees relative to the back cover"—which is just like a ***notebook***—while also "permitting easy addition or removal of loose-leaf pages"—which is just like a ***binder***. (A0129 col. 5:16-19, 38-40; A0063 col. 5:24-28, 46-48).

In sum, the patents are directed to binders that can open 360 degrees while also providing a flat writing surface, i.e., "a front cover that lies flatly beneath its back cover when the binder is open 360 degrees." (A0081).

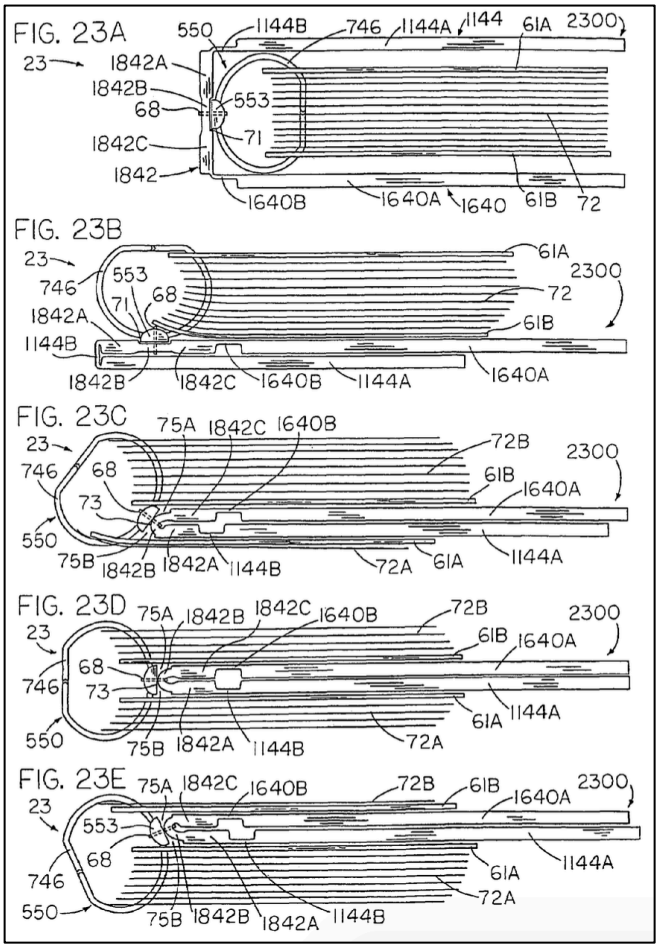
B. Binders that can open 360 degrees and provide a flat writing surface create structural challenges solved by the Patents-in-Suit.

A binder with the small footprint of a notebook, but with the removable pages of a binder, which can provide a flat writing surface, presents specific structural challenges. These challenges are solved by the Patents-in-Suit.

1. The Patents-in-Suit teach rings that can rotate by using the materials of the binder's cover.

A binder that can open 360 degrees, while providing a flat writing surface, is one of the primary goals of the Patents-in-Suit. To accomplish this, the Patents-in-Suit teach binder rings that can rotate about the binder's edge: "The rings of the binder can rotate around an edge of the flatly-folded cover to enable loose-leaves to lie flat above and below the cover." (A0081 Abstract). Because the rings can incrementally rotate about the binder's edge, loose-leaf pages that are both above and below the binder can lie flat. (A0135 col. 17:26-37). This is illustrated above (FIGS. **23**A-**23**E from the '640 Patent (A0109)), which shows incremental rotation of binder rings in various stages.

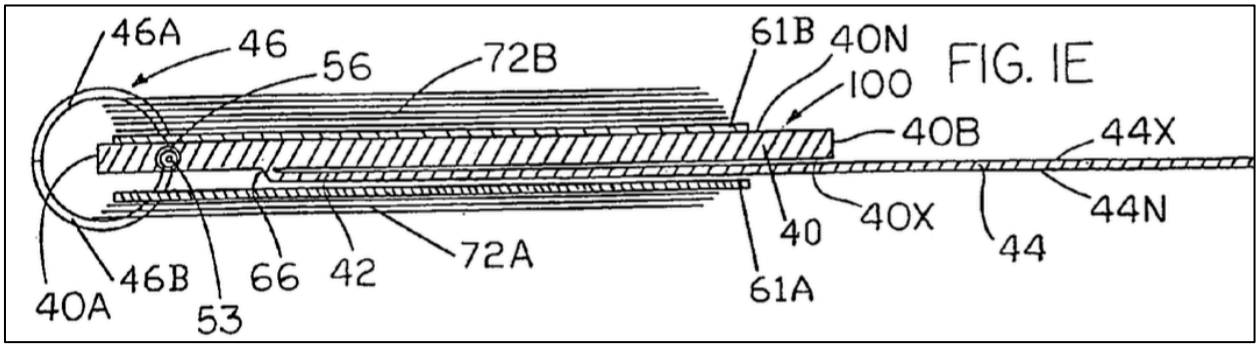
FIG. 23A-23E



The Patents-in-Suit teach different embodiments of binders with rotatable rings. For instance, in the first embodiment (FIG. **1**) of the '640 Patent, the rings rotate around a spine that rotates.

The binder includes two primary components: the skeleton and the cover. The skeleton includes a spine **53** with a plurality of rings. (A0134 col. 15:12-15). The cover includes a back cover **40**, middle cover **42** and front cover **44**. (*See e.g.*, A0134 col. 15:3-4). The back cover includes a conduit **56**, and the spine **53** rotates within the conduit **56**. (A0134 col. 15:22-25). Likewise, the spine **53** is a pivot about which the back cover **40** can rotate. (A0134 col. 15:27-28). When spine **53** rotates in the conduit, the rings rotate with it. (*Id.*)

FIG. 1E



As shown above in FIG. **1**E (A0085), because spine **53** can rotate, and because the rings can rotate with it, the loose-leaf pages that are above and below the binder can lie flat. When the skeleton rotates, this "prevents stress on loose-leaves **72** that could cause them to tear out of the rings **46**" and "also enables forward loose-leaves **72**A to lay flat against front cover **44** to provide flat writing

surfaces when the binder **1** is open 360 degrees". (A0134 col. 16:58-65). Thus, the more pages flipped around, the more the rings rotate. The patent states, "the more loose-leaves **72** flipped beneath, the greater is the angle of rotation of skeleton **50** from its upright position." (A0135 col. 17:16-21).

The rings shown in FIG. **1** rotate about a spine **53** that is separate from the front, middle and back covers. This is because spine **53** includes a synchronized switching element **51** that allows the rings to be simultaneously opened and closed. (A0135 col. 18:12-16). However, not all embodiments of the Patents-in-Suit include switching elements for simultaneously opening and closing the binder rings. In some embodiments, the rings are independently openable. In other words, they can be opened manually one at a time. (*See e.g.*, A0145 col. 38:55-57).

For instance, FIGS. **53**A-**53**B, which are depicted below (A0125), disclose rings that are independently-openable. Each ring "has tab **247** and corresponding slot **248**, which snap fit together forming interlock **308** to securely close" the ring. (A0153 col. 54:47-49). Numerous other embodiments in the '640 Patent include rings that are also independently openable, such as FIGS. **54**, **55**, **56**, **57**, **58**, **59** and **60**.

FIG. 53A

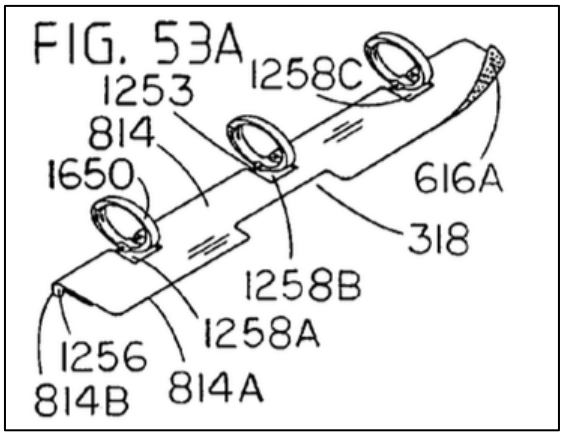
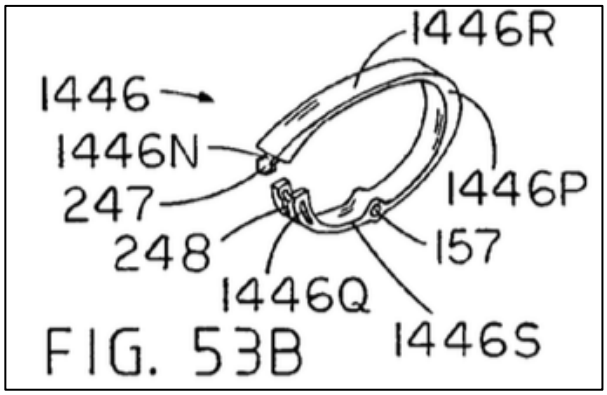


FIG. 53B

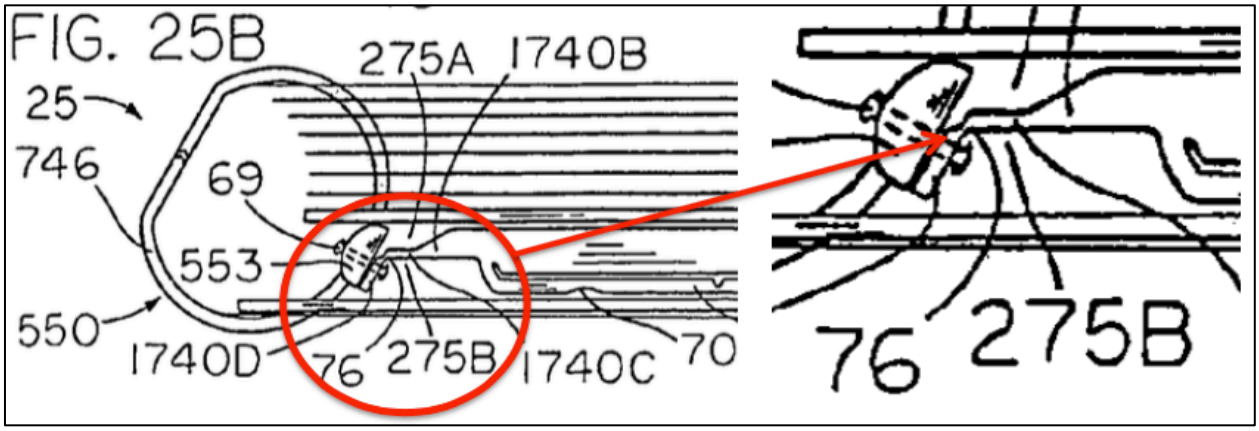


The rings of FIGS. **53**A-**53**B are independently-openable, but the skeleton is still "threaded by singular rod spine **1253**" for pivoting. (A0153 col. 53:55-56). In this way, "[s]pine **1253** is a type of orthogonal base for ring **1446** to facilitate pivoting". (A0153 col. 54:60-62). However, in still other embodiments, there is no spine at all, and no spine that is used for pivoting the rings. Instead, pivoting of the rings is accomplished with the materials of the cover *itself*, without any external spine.

For instance, in FIG. **25**B, which is depicted below (A0110), the skeleton **550** is fixed to the back cover **1740** via rivets, and therefore cannot rotate. (A0142 col. 31:45). The patent states, "[b]ecause skeleton **550** is riveted to back cover portion **1740**D, it cannot freely rotate relative to back cover portion **1740**D." (A0142 col. 31:51-53). Instead, skeleton **550** rotates via a "hinge joint", which is identified by number **76**. (A0142 col. 31:53-55). The "hinge joint" is located in the cover itself: "hinge joint **76** [is located] between back cover portions **1740**D

and **1740**C." (A0142 col. 31:54-55). Thus, rather than rotating about a rotatable spine in a conduit, such as in FIG. **1**, the rings of FIG. **25** "are rotatable about a near-ring edge of back cover portion **1740**C" via a "hinge joint" in the cover. (A0142 col. 31:55-57).

FIG. 25B

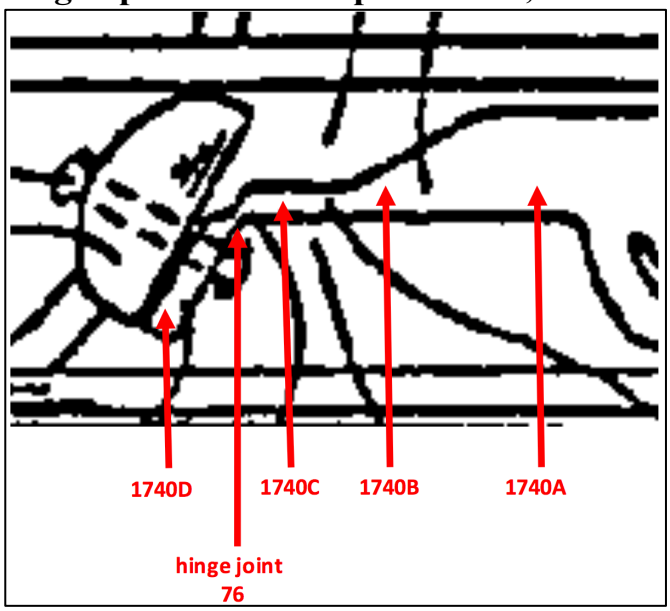


The "hinge-joint" is not the only part of the cover that helps rotate the rings. The "hinge joint" is also connected to a portion of the back cover **1740**C. This portion also helps rotation of the rings. This is the result of both its materials and its structure. Back cover portions include elastic materials that facilitate rotation, namely they are "typically made of cardboard, plastic, or other semi-rigid material." (A0134 col. 15:7-8). This teaching is made in connection with FIG. **1**, which comprehensively teaches numerous miscellaneous features of a preferred binder. (A0133 col. 14:61-A0136 col. 19:14). The specification follows with various alternate embodiments. FIG. **25** does not teach that the back cover is made

of any different materials, or that it cannot be made of cardboard, plastic or other semi-rigid material.

In addition to the material of **1740**C, its structure also helps rotation. Portion **1740**C is markedly thinned out. This is evident by comparing **1740**C with **1740**A below. The thickness of **1740**C is reduced compared to **1740**A. The patent states, "[b]ack cover portions 1740C-1740D are of **reduced thickness** relative to back cover portions 1740A . . . ." (A0142 col. 32:4-6) (emphasis added).

FIG. 25B
(enlarged portion of components 76, 1740A-D)



The patent teaches that similar areas of "**reduced thickness**" facilitate flexibility. For instance, FIG. **23** states, the "**reduced thickness** of middle cover portion 1842B also facilitates its greater flexibility relative to middle cover portions 1842A and 1842C . . . ." (A0141 col. 29:47-49) (emphasis added). And FIG. **53**E states, "[c]onduit casing 914B is **reduced in thickness** for increased

flexibility to act like a hinge . . . ." (A0154 col. 55:65-67) (emphasis added). Accordingly, portion **1740**C is an area of "reduced thickness". Because of this, it acts like a fulcrum to facilitate flexible rotation. Thus, FIG. **25** uses the materials of the cover itself, including the hinge joint **76** and back cover portion **1740**C, as a pivot about which the rings rotate.

FIGS. **54**H-**54**I, which are depicted below (A0126), also show embodiments where the materials of the cover facilitate rotation of the rings. The cover includes front, middle and back cover, as well as another portion of the cover, "conduit casing **1014**." (A0155 col. 57:43-44). "Conduit casing **1014** is attached to back cover portion **2540**A near hinge-like portion **1014**A." (A0155 col. 57:45-46). Thus, when the binder is open 360 degrees, the hinge-portion allows the rings to rotate. The patent states, "[w]hen cover **3043** is folded flatly open 360 degrees, hinge-like portion **1014**A enables conduit casing **1014** to dangle or droop down around edge-fold **2540**B where it is fairly flush with the flat formation of cover **3403**." (A0155 col. 57:62-66).

FIG. 54H
Binder closed

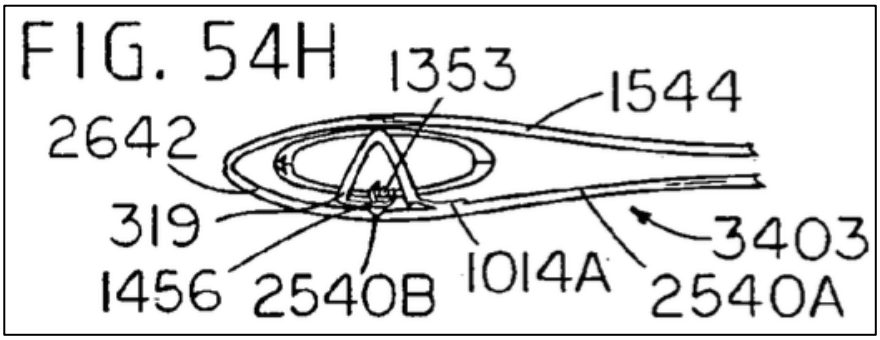
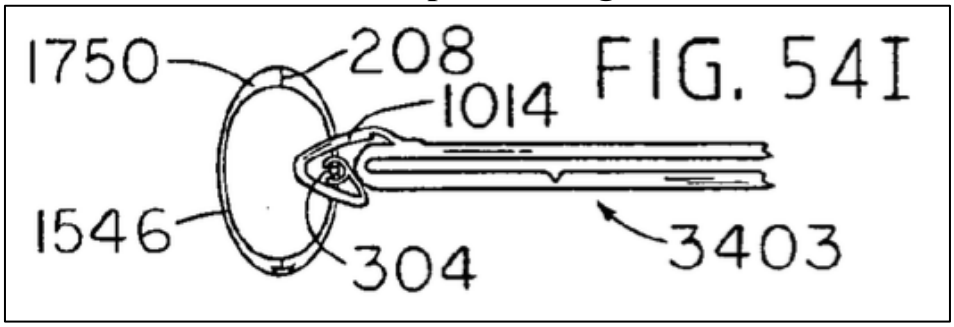


FIG. 54I
Binder open 360 degrees



In these figures (FIGS. **54**H-**54**I), the ring rotates both by a "hinge-like portion **1014**A" and bending of a fulcrum portio **1014**. This is shown above in FIG. **54**I. This bending of fulcrum **1014** is described as "dangling" or "drooping". (A0155 col. 57:62-66). The ring also rotates through a spine. Conduit casing includes a spine that can rotate, where the spine is "rotatably disposed," (A0155 col. 57:46-48).

The foregoing embodiments are all disclosed in the earlier '640 Patent. The later patent, the '140 Patent, was a continuation-in-part of the '640 Patent. (A0044). Similar to the '640 Patent, the '140 Patent also describes rotation of the rings by using the materials of the cover itself.

For the first time, the '140 Patent uses the phrase an "elastic pivot". In a preferred embodiment, an "elastic pivot" is described in connection with FIG. **19** of the '140 Patent. The patent teaches: "Elastic pivot **22** comprises elastic hinge **222**A and fulcrum **222**B. Fulcrum **222**B contributes to rotation of rings **2246**

about edge-fold **2640** via cantilever bending." (A0075 col. 29:65-67). The preferred embodiment of an "elastic pivot" thus includes a hinge and a fulcrum that bends like a cantilever.

Claim 20 of the '140 Patent is directed to a binder that uses the materials of the binder cover for rotatable rings. The language pertaining to the "elastic pivot" and "hinge joint" are highlighted because those terms are relevant to this appeal.

> 20. A loose-leaf binder comprising:
>
> a cover;
>
> a plurality of independently openable elastic binder rings that are each securely closable via a respective interlock closure;
>
> at least one **elastic pivot or hinge joint**;
>
> each of said interlock closures having a tab and a slot at opposing ends of a curved member that are snapped together flush to form a smooth securely-closed ring,
>
> at least a portion of said cover is disposed in a flat formation with a near-ring edge when said cover is open 360 degrees,
>
> each of said elastic binder rings aligned and attached to said cover adjacent said near-ring edge,
>
> each of said elastic binder rings having an inner diameter greater than a thickness of said flat formation,
>
> said **elastic pivot or hinge joint** located adjacent said near-ring edge and enabling a portion of at least one of said elastic binder rings to rotate about said near-ring edge;
>
> said **elastic pivot or hinge joint** is disposed flush or flatly relative to said flat formation of said cover to enable a sufficiently smooth surface for writing on ring-bound loose-leaves stacked thereon, and said **elastic pivot or hinge joint** remaining flush or flat relative to said flat formation when said

> portion of at least one of said elastic binder rings rotates about said near-ring edge,
>
> a portion of each of said elastic binder rings rotatable about said near-ring edge to enable each of said elastic binder rings to straddle the two parallel geometric planes respectively containing the top and bottom surfaces of said flat formation of said cover,
>
> said **elastic pivot or hinge joint** is roughly axially disposed relative to opposing rotations of said flat formation and said elastic binder rings while said elastic binder rings remain closed,
>
> whereby ring-bound loose-leaves stacked flatly above said flat formation are substantially parallel to ring-bound loose-leaves stacked flatly below said flat formation when said binder is open 360 degrees and placed on a flat surface.

(A0078 col. 36:37-A0079 col. 37:9).

2. The '640 Patent describes compressible rings for thin binders and improved page-turning.

A binder with rings that can rotate creates additional challenges. For instance, the ring "capacity"—or the amount of paper that can fit on a ring—changes as the ring rotates. In the case of elliptical rings, the '640 Patent identifies the problem: "elliptical rings immediately decrease in loose-leaf capacity as spine **53** begins to rotate and ring prongs enter the plane of the back cover" of the binder. (A0144 col. 36:51-53).

Thus, another goal of the '640 Patent is to provide a unique, functional ring shape that has sufficient capacity when the binder is open 360 degrees: "a ring shape that provides substantially constant capacity during operation when the

skeleton may be rotated from its upright position." (A0129 col. 5:56-58; A0063 col. 5:64-66).

Another challenge is to make the binder thin enough for ordinary use, such as when it is "crammed into a crowded briefcase or bookshelf." (A0153 col. 53:59-61). This may require smaller rings. But smaller rings have reduced "capacity". And if the rings are permanently flattened out, to make the binder thin, then that can make page-turning much harder. (*See* A0152 col. 51:49-63).

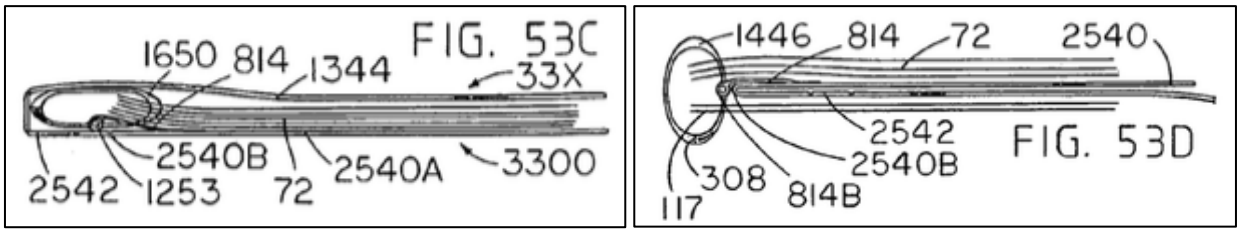
To solve these challenges, the '640 Patent discloses numerous embodiments of binders including "reversibly compressible rings." (*See e.g.,* A0153 col. 53:55-56). The rings are intended to be "reversibly deformable under typical vertical compressive force" exerted on the rings. (*Id.* col. 53:57-59). An example of this "typical" compressive force includes the force that "might be found if [the binder] is crammed into a crowded briefcase or bookshelf." (*Id.* col. 53:59-61).

Compressible rings serve dual functions. First, as discussed, compressible rings create especially thin binders during use—such that it is easily "crammed into a crowded briefcase or bookshelf." (A0153 col. 53:59-61; *see also* col. 53:67-54:1 ("vertical reversible deformation of rings **1446** facilitates the design of ultra thin, closed cover"); col. 54:34-36 (reversible deformation "is related to the objective of constructing a thin cover and distinguishes [reversibly deformable] ring[s] from conventional circular rings").

Second, compressible rings improve page-turning. The compressible rings "provide improved page turning via the additional clearance afforded compressible rings". (A0153 col. 54:6-8; *see also* col. 54:33-35 ("the reversibly deformable rings **1446** facilitate easy page turning implied in FIG. **53**D")). The patent explains that rings that can expand when the binder is open improves page-turning: "the minor inner diameter of the freely expanded ring is . . . greater than" when it is compressed "because this condition is related to satisfactory page-turning." (A0153 col. 54:30-33).

The dual functions of compressible rings is shown below in FIGS. **53**C and **53**D. (A0125). On the one hand, the ring **compresses** for a thin binder during use (FIG. **53**C). On the other hand, the ring **expands** when the binder is open for improved page-turning (FIG. **53**D).

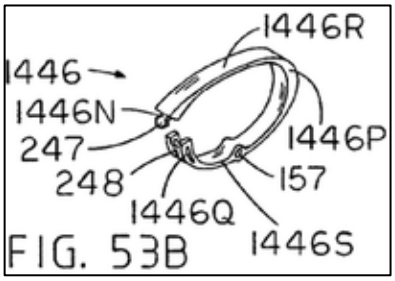
FIG. 53C **FIG. 53D**



The '640 Patent teaches specific ring structure that achieve the benefits of compressible rings. For instance, in a preferred embodiment, shown in FIG. **53**B (A0125), the rings have "column-like roughly vertical thick portions **1446**P-**1446**Q." (A0153 col. 54:37-38). These column-like portions "taper to roughly

horizontal thin bow-like ring portions **1446**R-**1446**S". (A0153 col. 54:38-40). Thus, the vertical sides are "relatively thicker" and the horizontal top and bottom are "relatively" "thin". (A0153 col. 54:40-43).

FIG. 53B



This structure "facilitate[s] reversible deformation" in a very specific way: the column-like portions "resist permanent buckling under typical vertical compressive forces," such as when the binder being crammed into a crowded briefcase or bookshelf. (A0153 col. 54:40-42; col. 53:57-61). Meanwhile, the horizontal thin portions "easily flatten under these same vertical compressive forces and spring back upon their removal." (*Id.* col. 54:43-46). Accordingly, the top and bottom portions flatten out, whereas the vertical portions resist permanent buckling. In this way, "**the majority of the designed reversible deformation**" is achieved by flattening of the horizontal portions—not by compression of the vertical portions. (*Id.* col. 54:46-47) (emphasis added).

This is shown explicitly in some preferred embodiments. For instance, FIGS. **55**A-**55**B demonstrate compression of the rings where thin upper portion (**1646**R) and the thin lower portion (**1646**S) both flatten out, whereas the vertical

column-like thick portions (**1646**P, **1656**Q) resist permanent buckling. (A0126). This way, most of the "compression" is performed by the horizontal portions, whereas the vertical portions stay relatively rigid.

FIG. 55A
Expanded

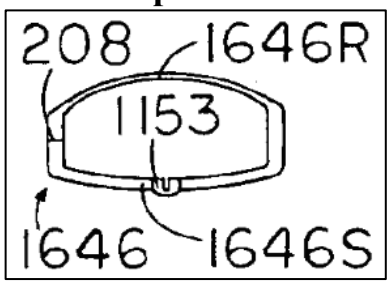
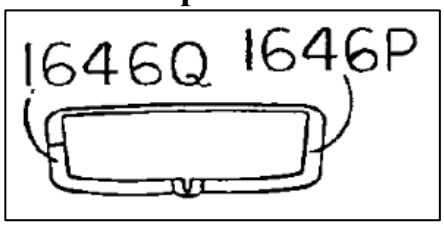


FIG. 55B
Compressed



In FIGS. **55**A-**55**B, the columns are equally sized. However, not all disclosed embodiments have equally-sized column-like thick portions on both sides of the ring. Some embodiments disclose rings where one side of the ring has a much bigger column-like portion.

For instance, FIGS. **59**A-**59**B are expressly described as having plural vertical column-like portions: "[w]hen upright and closed, ring **2046** has roughly vertical column-like portions that are relatively thicker than its roughly horizontal bow-like portions." (A0156 col. 59:66-60:1). However, this embodiment does not have equally-sized column-like thick portions on each side of the ring. In fact, the ring is described as having a "roughly triangular shape" when expanded in FIG. **59**A. (A0156 col. 59:60-62). This is evident from the figures below. (A0126).

Importantly, the *left* side of the ring is not "column-like". And even if it is, only a small sliver of the thicker portion is "column-like."

FIG. 59A
Expanded

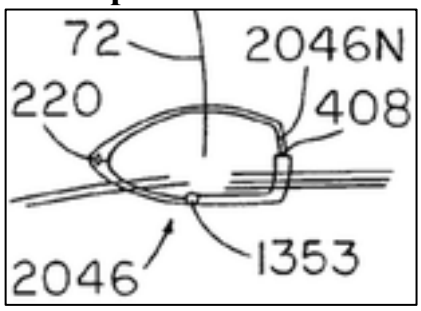
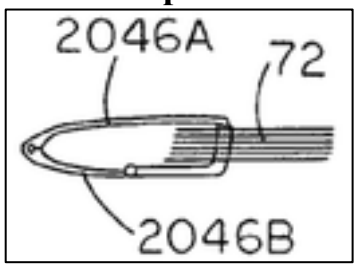


FIG. 59B
Compressed



Unlike FIGS. **55**A-**55**B, which expressly call out the opposing column-like thick portions with the letter P and Q, FIG. **59** does not do that. Rather, even though these rings are described as having plural column-like thick portions, those plural portions are not expressly identified as being on opposite sides of the ring. No letters P and Q or any other demarcations are used to identify opposing column-like thick portions. This is true for other figures in the '640 Patent as well, such as FIGS. **57**A-**57**B, which are also described as having column-like thick portions. (A0156 col. 59:13-33).

However, despite having a roughly triangular shape, and despite having only a small sliver of a portion actually "column-like" on the left side, FIGS. **59**A-**59**B nonetheless satisfy the same functional requirements of the "column-like thick portions". That is, they facilitate the dual functions of compressible rings: they resist permanent buckling when vertically compressed, for a thin binder. And they

are designed for improved page turning. The patent states that they "expand and compress" as well as provide "improved page turning." (A0156 col. 60:1-8). And the upper and lower portions flatten out, whereas the right side of the ring resists permanent buckling. (A0126).

Claim 17 of the '640 Patent is directed to a binder with compressible rings. The language pertaining to the "roughly-vertical column-like thick portions" is highlighted.

> 17. A binder for releasably binding a plurality of loose-leaves comprising:
>
> at least one ring that is openable and closable;
>
> an orthogonal base;
>
> a closure to secure ring closed;
>
> said ring has an oblong perimeter;
>
> said ring has a minor diameter defining an upright ring position when said minor diameter is substantially vertical;
>
> said ring has **roughly-vertical column-like thick portions** when situated in said upright ring position;
>
> said ring has a roughly-horizontal bow-like thin upper portion when situated in said upright ring position;
>
> said ring has a roughly-horizontal extendable lower portion when situated in said upright ring position;
>
> each of said **column-like thick portions** are on average thicker than said bow-like thin upper portion;
>
> said orthogonal base perpendicularly intersects said lower portion of said ring;

> said ring is reversibly compressible relative to a moderate compressive force roughly exerted in the direction of said minor diameter such that said **column-like thick portions** resist permanent buckling while said bow-like thin upper portion and said extendable lower portion more readily flatten and widen outward to provide most of desired reversible vertical compressibility and spring back to resume relaxed expanded form of said ring upon removal of said moderate compressive force.

(A0158 col. 64:40-67).

II. BACKGROUND OF THE INVENTOR, JAMES S. CHIZMAR

Plaintiff, James S. Chizmar ("Chizmar"), is an individual inventor. (A0044, A0081). He originally conceived of the design for an improved binder while in business school at Columbia University. (A0351-A0352 12:9-16:4). After that, he spent years inventing, developing, designing and prototyping new and improved binders. (A0353-355 24:17-30:2). He took courses in traditional mechanical drawing as well as computer-aided design so that he could draw all the figures in his patents. (A0353 24:17-25:21). In addition to the two patents asserted in this case, Chizmar received three additional United States patents on his improved binder designs. (A0356 66:4-67:22).

III. BACKGROUND OF THE ACCUSED FLEX BINDERS

The accused Flex Binders do precisely what the Patents-in-Suit claim—they act like a notebook, but work like a binder. The accused product itself states: "Acts like a **notebook**. Works like a **binder**." (A0300-303) (emphasis in original). [redacted]

[redacted]

There are three versions of the Flex Binders accused in this case, shown below: (1) Current XL; (2) Current Large; and (3) Current Small.[1] (A0318; A0332-334). These versions refer to the different rings used in the Flex Binders. (A0318).

Current XL	**Current Large**	**Current Small**
REDACTED	REDACTED	REDACTED

The horizontal line on the right-sided column is the snap closure, where the ring opens and closes. (A0019). The backing portion on the bottom is where the ring connects to the binder. (*Id.*).

[1] The District Court's Opinion discusses five types. (A0020). For the purposes of this appeal, Chizmar only appeals infringement of the Current XL, Current Large and Current Small.

Image from District Court's Opinion (A0019)
REDACTED

The functional advantages of claim 17 of the '640 Patent mirror those of the accused Flex Binders. The patent teaches that the binder "conveniently packs in brief cases and book bags," and can be "crammed into a crowded briefcase or bookshelf." (A0129 col. 5:29-30; A1053 col. 53:57-61). [redacted]

Further, as discussed above, the '640 Patent teaches that its ring shape improves "page-turning". (A0133 col. 14:32-37, col. 14:45-51; A0153 col. 54:33-37; A0156 col. 59:24-30). [redacted] Thus, there was no dispute that

Defendants' accused binders were designed to meet the same inventive goals previously described in Chizmar's patents.

IV. BACKGROUND OF THE DISTRICT COURT'S SUMMARY JUDGMENT DECISION

A. The District Court held Claim 20 of the '140 Patent is invalid because it claim the benefit of an earlier priority date.

At the District Court, Defendants argued that Claim 20 of the '140 Patent was invalid because the accused Flex Binders were on sale over a year before the filing date of the '140 Patent. (A0006-07). Chizmar did not dispute the date the Flex Binders were first offered for sale. (A0006-07). Rather, he argued that Claim 20 of the '140 Patent is entitled to an earlier priority date because it was described in an earlier patent, namely the '640 Patent, which has a filing date of March 4, 2004. (A0081; A0007). Thus, according to Chizmar, because the filing date of the '640 Patent (2004) indisputably pre-dated the first offer for sale of the Flex Binders (2005/2006), then Claim 20 of the '140 Patent was not anticipated by the Flex Binders. (A0006-07).

Claim 20 of the '140 Patent recites: "at least one elastic pivot or hinge joint." (A0078 col. 36:42). A "hinge joint" is indisputably disclosed in FIG. **25** of the '640 Patent. Instead, the District Court found that an "elastic pivot" was not adequately described in the '640 Patent. (A0009). The District Court reasoned that the "hinge joint" in FIG. **25** cannot adequately describe an "elastic pivot" for

two reasons. First, the District Court found it "is not disclosed to be elastic." (A0010). Second, "[t]here is no disclosure of cantilever bending by any portion of the hinge joint." (A0011).

Chizmar also relied upon FIG. **54** of the '640 Patent as description for the "elastic pivot." However, the District Court found that in this embodiment, "the rotation of the rings relative to the back cover appears to be achieved primarily by 'rotatably disposing' the spine of the rings fixture inside a 'conduit casing' that is attached to the cover" and thus, even thought this figure discloses a "hinge-like portion", the District Court found that it does "not serve the same function [in FIG. **54**] as the elastic pivot does in Claim 20 of the '140 Patent." (A0011 n.5).

B. The District Court held Claim 17 of the '640 Patent is not infringed either literally or under the doctrine of equivalents.

The District Court construed Claim 17 of the '640 Patent, which recites "roughly-vertical column-like thick portions" as well as a "bow-like thin upper portion." (A0158 col. 64:49-52) The District Court stated: "Claim 17 requires at least two column-like thick portions on opposite sides of the ring, separated by the bow-like thin upper portion." (A0021).

The District Court reasoned that the "only column-like thick portions expressly identified in the specification" are "depicted on either side of expressly identified bow-like horizontal thin portions", and where not expressly identified, "horizontal thin portions are shown supported on either side by thicker vertical

portions." (A0017). The District Court further reasoned that, if the "column-like thick portions" were not required to be on opposite sides of the ring, that would conflict with other language in the claim. Specifically, the District Court stated: "If the bow-like portion were supported by a column-like thick portion on only one side, it is unclear why the flattening and widening would happen; instead, the unsupported side of the bow-like portion would be expected to bend downward." (A0017). Consequently, because District Court found that the accused Flex Binders all have rings where the left side is not thicker than the upper portion, none of the rings infringe literally claim 17 of the '640 Patent. (A0019).

The District Court also found no infringement of any of the accused Flex Binders under the doctrine of equivalents. Importantly, the District Court found that the function of the patent's "column-like thick portions" differed from the function of the rigid portion of the Flex Binder rings. (A0023). The claim recites that the "column-like thick portions resist permanent buckling." (A0158 col. 64:61-62). The District Court acknowledged that Chizmar proffered evidence from a person of ordinary skill (Edward Busam) [redacted]

CONFIDENTIAL MATERIAL REDACTED

[redacted] Consequently, the District Court found no genuine issue of material fact existed that the rigid portion of the Flex Binder rings was an equivalent to the "roughly-vertical column-like thick portions" recited in Claim 17 of the '640 Patent. (A0024).

SUMMARY OF THE ARGUMENT

This case was disposed on summary judgment after an abbreviated discovery period limited exclusively to Defendants' grounds for summary judgment, and without a separate *Markman* hearing. The District Court committed the following errors finding no issue of fact existed warranting full discovery and trial.

With respect to the '640 Patent, the patent includes embodiments, such as FIG. **59**, showing the column-like thick portions can be different sizes. The right column can be bigger than the left. In that case, the right column performs more of the functionality required by the claim, namely resisting permanent buckling under compressive force. By contrast, the left column, which has a much smaller portion that is actually "column-like," performs less. The accused Flex Binder rings are not insubstantially different from this embodiment. The accused rings indisputably have one big column on the right side of the ring. Chizmar proffered testimony from a person of skill that this big column was designed with enough "stiffness" so that, when it is compressed, it does not "break or deflect". Thus, it resists permanent buckling, i.e., the very functionality required by the "column-like portions". The claim only requires a sliver of a column on the left side. Even without this sliver, the District Court erred by finding that Defendants' rings are insubstantially different from the claimed ring.

The District Court faulted the testimony proffered by Chizmar. It found that that testimony showed that the ring was designed to ensure the snap closure works properly, not to resist permanent buckling under compressive force. Importantly, the District Court reasoned that the '640 Patent was silent that the "column-like thick portion" facilitates snap closure. But the District Court overlooked intrinsic evidence from the specification that teaches just that. The '640 Patent teaches that the snap closure is on the right column so that "vertical compressive force tends to reinforce ring closure". Thus, it was error for the District Court to conclude the issues of fact did not exist with respect to infringement under the doctrine of equivalents.

With respect to literal infringement of the '640 Patent, the District Court erroneously construed Claim 17 to require the "column-like thick portions" must be on opposite sides of the binder ring. The District Court acknowledged this construction was a departure from the claim's plain and ordinary meaning. And yet, the District Court identified no lexicography and no disclaimer by the patentee. Rather, the District Court simply reasoned that its construction was consistent with the preferred embodiments. The District Court further speculated that the ring would not work properly unless both column-like portions were on opposite sides of the ring. But the District Court pointed to no intrinsic or extrinsic evidence to support this speculation. And it is contradicted by one of the preferred

embodiments, namely, FIG. **59**. As that embodiment shows, even where one column-like portion is only a small sliver, and not "column-like", the ring still functions as recited in the claim. Thus, it was error for the District Court to erroneously add a limitation to the claim in the absence of lexicography or disavowal.

With respect to the '140 Patent, the District Court erroneously found that FIG. **25** of the '640 Patent cannot adequately describe an "elastic pivot". The District Court found that the "hinge joint" in FIG. **25** is not elastic. But the patent teaches that a hinge joint can be made of "semi-rigid material", and the District Court acknowledged that "semi-rigid materials" are elastic. The District Court also defined "elastic" to mean "[c]apable of sustaining deformation without permanent loss of size or shape", and the hinge joint meets that definition because it is a hinge about which binder rings rotate, and rotate back.

The District Court also erroneously found that FIG. **25** does not describe cantilever bending. But the District Court overlooked that **1740**C is an area of reduced thickness—which the patent describes as imparting flexibility. And it can be made of plastic—the very same material of the fulcrum described in the '140 Patent that bends like a cantilever. Thus, FIG. **25** discloses a fulcrum that exhibits cantilever bending.

Finally, the District Court erroneously found FIG. **54** also does not describe an elastic pivot. It found that in FIG. **54**, the rings rotate through a spine, not through a hinge or a fulcrum. But the District Court overlooked evidence that the rings also rotate through a portion (**1014**A) explicitly described as "hinge-like" that is connected to a portion (**1014**) that "dangles or droops" just like the cantilever bending of a fulcrum. In sum, it was error for the District Court to conclude issues of fact did not exist as to whether an "elastic pivot" was described in the '640 Patent.

STANDARD OF REVIEW

I. CLAIM CONSTRUCTION

This Court reviews claim construction de novo. *Thorner v. Sony Computer Entm't Am. LLC,* 669 F.3d 1362, 1365 (Fed. Cir. 2012); *see also Teva Pharmaceuticals USA, Inc. v. Sandoz, Inc.*, 135 S.Ct. 831, 841 (2015). "[S]ubsidiary factual findings about [the] extrinsic evidence" underpinning a claim construction by the District Court are "reviewed for clear error on appeal." *Teva Pharmaceuticals,* 135 S.Ct. at 841 (2015)

II. SUMMARY JUDGMENT OF INVALIDITY

The District Court invalidated Claim 20 of the '140 Patent on the ground that it could not claim the benefit of the '640 Patent, and was therefore anticipated by Defendants' sale of the Flex Binders. (A0014). Thus, the District Court found that Chizmar failed to show an issue of fact to defeat summary judgment regarding whether "the '640 Patent satif[ied] the written description requirement." (*Id.*).

"A district court's grant of summary judgment on written description is reviewed de novo." *Crown Packaging Tech., Inc. v. Ball Metal Bev. Container Corp.*, 635 F.3d 1373, 1380 (Fed. Cir. 2011).

In the context of a patent that is a continuation-in-part ("CIP") of an earlier application, this Court has held there is "no reason to presume that claims in a CIP application are entitled to the effective filing date of an earlier filed application,"

especially "[w]hen neither the PTO nor the Board has previously considered priority." *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1305 (Fed. Cir. 2008).

However, in *Tech. Licensing Corp. v. Videotek, Inc.*, this Court clarified its holding in *PowerOasis*, and held that "*PowerOasis* says nothing more than, and should be understood to say, that once a challenger (the alleged infringer) has introduced sufficient evidence to put at issue whether there is prior art alleged to anticipate the claims being asserted, prior art that is dated earlier than the apparent effective date of the asserted patent claim, the patentee has the burden of going forward with evidence and argument to the contrary." 545 F.3d 1316, 1328-29 (Fed. Cir. 2008).

Thus, this Court confirmed in *Videotek* that the challenger always has the ultimate burden of persuasion, even when challenging a CIP patent for which the patentee is claiming priority to an earlier-filed application, such as in this case. This Court held: "because an issued patent is by statute presumed valid, a challenger has the burden of persuasion to show by clear and convincing evidence that the contrary is true. **That ultimate burden never shifts,** however much the burden of going forward may jump from one party to another as the issues in the case are raised and developed." *Videotek*, 545 F.3d at 1329 (emphasis added). To meet this burden (i.e., proof of invalidity) requires meeting the heightened clear

and convincing evidence standard. *Microsoft Corp. v. i4i Ltd. P'ship*, 131 S. Ct. 2238, 2242 (2011).

III. SUMMARY JUDGMENT OF NONINFRINGEMENT

Although infringement, "whether literal or under the doctrine of equivalents, is a question of fact," *Bai v. L & L Wings, Inc.*, 160 F.3d 1350, 1353 (Fed. Cir. 1998), a District Court's grant of summary judgment with respect to infringement is reviewed de novo and without deference. *Board of Regents of the University of Texas System v. BENQ America Corp.*, 533 F.3d 1362, 1367 (Fed. Cir. 2008).

ARGUMENT

I. THE JUDGMENT THAT THE FLEX BINDERS DO NOT INFRINGE THE '640 PATENT SHOULD BE REVERSED.

A. The District Court erred by finding that an issue of fact did not exist whether the Flex Binders infringe Claim 17 of the '640 Patent under the doctrine of equivalents.

The key to the doctrine of equivalents is whether its application *vitiates* a claim limitation. *See Brilliant Instruments, Inc. v. GuideTech, LLC*, 707 F.3d 1342, 1347 (Fed. Cir. 2013). The District Court construed Claim 17 of the '640 Patent to require that the "column-like thick portions" must be on opposite sides of the ring. (A0016). But that construction does not require that the opposing column-like thick portions must be equally sized. Literal infringement does not require two equally-sized column-like portions. Thus, to avoid vitiating that claim limitation does not require structure that is equivalent to two equally-sized columns.

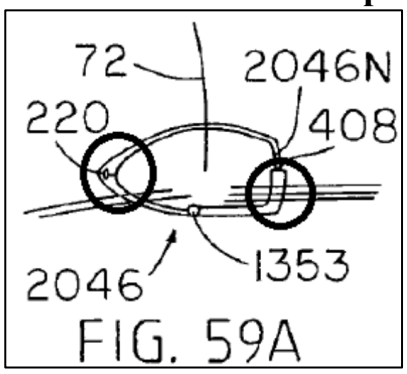
Yet, this is what the District court suggested, i.e., that infringement under the doctrine of equivalents required Chizmar to show that a *single* column is equivalent to *two* equally-sized columns.[2] (A0023). Instead, satisfying the

[2] Even if it did, this Court has held accused singular structure can be equivalent to claimed plural structure. *See Data Line Corp. v. Micro Technologies, Inc.*, 813 F.2d 1196, 1202 (Fed. Cir. 1987) ("We conclude that a reasonable jury could have found that a single sensor with multiplex switching is the equivalent of multiple sensors with multiple switches . . ."); *Endress + Hauser, Inc. v. Hawk Measurement Sys. Pty. Ltd.*, 122 F.3d 1040, 1043 (Fed. Cir. 1997) (affirming that

doctrine in this case requires much less in this case. The claim only requires showing that Defendants' ring with one column-like portion on the right side is insubstantially different to a ring like that in FIG. **59**, where the left side is: (i) at most a sliver of a "column-like" portion, and (ii) performs less functionality required by the claim.

Depicted below is FIG. **59**A. The District Court found that this embodiment has column-like thick portions on opposite sides of the ring. The District Court stated, "[i]n [FIG. **59**A], the ring's upper portion is supported on either side by a thicker portion." (A0017-18). The left side may be "thicker", but the claim requires a "column-like portion." The portion of the left side that is actually "column-like" is at most a sliver.

Image taken from District Court's opinion. (A0018)



"generat[ing] a level indication in response to a single transmitted pulse" in the accused product was equivalent to using multiple pulses, as described in the patent). These cases discuss equivalence under section 112, ¶6, but they nevertheless support the principle that a single structure is not per se inequivalent to claimed plural structure.

The column-like thick portion on the *right* side of the ring is bigger than that on the *left* side. This is particularly apparent when FIG. **59** is viewed in its compressed state. (A0126).

FIG. 59A
Expanded

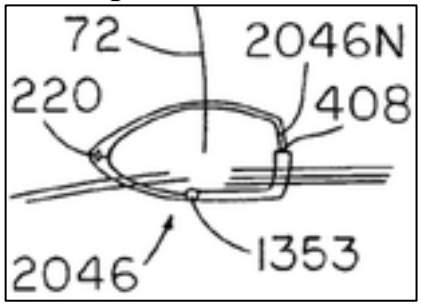
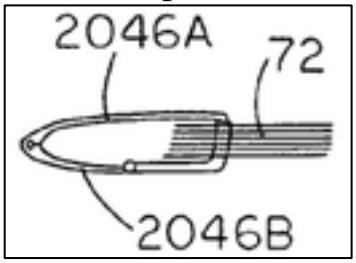


FIG. 59B
Compressed



Because the *right* side of the ring is bigger then the *left* side, then the right side performs more functionality of the "column-like thick portions" required by the claim—resisting permanent buckling under vertical compression. The *left* side performs less. Defendants' Flex Binder rings indisputably have a column-like thick portion on the *right* side of the ring. This was confirmed by the District Court. (A0019). Chizmar proffered testimony (discussed below) that the *right*-side of Defendants' rings perform the very functionality required by the claim—resisting permanent buckling under vertical compression. Thus, even if Defendants' rings do not have column-like thick portions on the *left* side, the difference between Defendants' rings (a column on the right side) and FIG. **59** in the '640 Patent (a column on the right side, and a sliver of a column on the left) are insubstantial.

At the District Court, Chizmar proffered particularized testimony of a person of ordinary skill. Specifically, he proffered the testimony from ACCO's 30(b)(6) witness, Edward Busam. Mr. Busam is a person of ordinary skill because he has a degree in mechanical engineering and more than five years experience with the design, structure, and operation of mechanical consumer products, and in particular, notebooks and binders. (A0362 6:24-7:3; A0362 7:19-A0367 29:15; A0364 17:12-17 (his "core competency" includes "consumer products"); A0366 23:5-19 (he was involved in the development of "Many. Many." notebooks and binders)). These qualifications render Mr. Busam a person of ordinary skill in this art under both Plaintiff's and Defendants' proposed definition of a person of ordinary skill. (A0405-A0409). Neither the District Court nor Defendants disputed that Mr. Busam is a person of ordinary skill in the applicable art. (A0022-24).

The District Court disagreed that Mr. Busam's testimony satisfied the function-way-result test. Specifically, the District Court found that Mr. Busam testified to a different *function*. The District Court stated, "Busam describes the *function* of the rigid portion differently from what Chizmar's selective quotations suggest." (A0023) (emphasis added). In particular, the District Court found that according to Mr. Busam's testimony, "the 'function' of the rigid portion is to ensure that the snap closure works properly, not to ensure reversible

compressibility or to resist vertical pressure in the abstract." (A0023). Yet, a close inspection at Mr. Busam's testimony shows this was error.

For ease of reference, the letters referred to below by Mr. Busam (such as JJ, II) are identified on the ring below. (A0332).

REDACTED

The markings above in red are annotations by Chizmar based upon the diagram of the unsnapped ring, shown below. (A0328).

REDACTED

CONFIDENTIAL MATERIAL REDACTED

[redacted]

[redacted]

Therefore, [redacted]

By contrast, the District Court found Mr. Busam testified that the function of the right side of the ring is "to ensure that the snap closure works properly". (A0023). [redacted]

[redacted]

The District Court's error is evident from the specification. The District Court reasoned that "resisting permanent buckling" is not the same as "ensuring the snap closure works properly" because, as the District Court stated, "[t]here is nothing in the '640 Patent to suggest that the 'roughly-vertical column-like thick portions' similarly serve to facilitate ring closure." (A0023). That finding was incorrect. The District Court overlooked intrinsic evidence from the '640 Patent teaching just that. Importantly, Chizmar never had the opportunity to respond to this point because it was made for the first time within the District Court's opinion. (Defendants' summary judgment briefs are available at A0213-243; A0275-295).

Contrary to the District Court's finding, the '640 Patent expressly teaches the column-like portions facilitate ring closure. The patent states that the interlock closure (the place where the ring snaps open and closed) "is suitably located on vertical ring portion **1446**Q [i.e., the column-like thick portion on the right side of the ring] where vertical compressive force tends to reinforce ring closure . . . ." (A0153 col. 54:54-56). Indeed, all embodiments with compressible rings and a snap closure include the snap closure on the thick right rigid side of the ring. (*See e.g.,* FIGS. **53**-**59**, A0125-126). Thus, the '640 Patent expressly teaches that the

right column-like thick portions facilitate ring closure. Indeed, the patent teaches that this is why the snap-closure is located on the right column-like thick portions.

This teaching from the patent is in sharp contrast to the District Court's finding. Given that this finding was critical to holding non-infringement under the doctrine-of-equivalents, that holding was error. Thus, the District Court erred by finding that, based upon Mr. Busam's testimony, an issue of fact did not exist as to whether the accused Flex Binders infringe under the doctrine of equivalents.

B. The District Court erred by construing "roughly-vertical column-like portions" must be on opposite sides of the ring.

Claim 17 of the '640 Patent recites "roughly-vertical column-like thick portions" as well as a "bow-like thin upper portion." There was no *Markman* hearing or separate claim construction briefing in this case. Instead, the District Court ordered that "[a]ny issues of claim construction related to the motion may be addressed in the summary judgment submissions." (A0212). Though it is not explicit in the District Court's summary judgment opinion, the District Court construed the "roughly-vertical column-like thick portions" in Claim 17 to mean: "Claim 17 requires at least two column-like thick portions on opposite sides of the ring, separated by the bow-like thin upper portion." (A0016).

The District Court's construction is a departure from the claim's plain and ordinary meaning. It requires that the "column-like thick portions" are separated by the "bow-like thin upper portions." (A0016). The District Court acknowledged

that the claim does not expressly say that. The District Court stated: "the bow-like thin upper portion is not expressly defined as separating the column-like thick portions". (*Id.*). Thus, by the District Court's own finding, its construction was a departure from the claim's plain and ordinary meaning.

To depart from that plain and ordinary meaning of a claim term, only two exceptions exist: lexicography or disavowal. *See e.g., Thorner*, 669 F.3d at 1365 ("There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution."). The standard for finding lexicography or disavowal is exacting: "[b]oth exceptions require a clear and explicit statement by the patentee." *Id.* at 1368-69.

As shown in its decision granting summary judgment, the District Court identified no lexicography or disavowal to justify its departure from the plain meaning of Claim 17. Moreover, the District Court identified none of the hallmarks enumerated by this Court as evidence of lexicography or disavowal. This Court recently identified those hallmarks. *See GE Lighting Solutions, LLC v. AgiLight, Inc.,* 750 F.3d 1304, 1309 (Fed. Cir. 2014). Yet, in this case, the District Court identified none of them. The claim does not explicitly recite "two" column-like portions. The claim does not recite "separate" column-like portions. The patent does not distinguish the prior art over column-like thick portions on only

one side of the ring. The patent never describes the "column-like portions" as the present invention.

The patent also does not stress the importance of two, separate column-like portions. Chizmar pointed out that the patent discloses a "ring-crush resistor," such as portion **119**D in FIG. **54**B. (A0125). This portion is "thick and rigid" to avoid ring crush "under compression." (A0154 col. 56:59-65). Thus, the patent suggests rigid vertical portions on *one side* can be sufficient to avoid buckling of vertical column-like portions and crushing the ring. This is the opposite of stressing the importance of two separate column-like portions.

Instead, the District Court merely identified the patent's preferred embodiments and reasoned that its construction was consistent with them. The District Court stated that the column-like thick portions identified in the specification "are depicted on either side of expressly identified bow-like horizontal thin portions", and where they are not, "horizontal thin portions are shown supported on either side by thicker vertical portions." (A0017). At best, this reasoning shows consistency with some of the patent's preferred embodiments. That is insufficient to rise to the **exacting** standard necessary to depart from a claim term's plain and ordinary meaning.

Worse, the District Court's construction is *inconsistent* with other preferred embodiments. For instance, FIGS. **59**A-**59**B are depicted below. (A0126). This

embodiment is expressly described as having "roughly vertical column-like portions", and therefore it is an embodiment of Claim 17. (A0156 col. 59:66-67).

FIG. 59A
Expanded

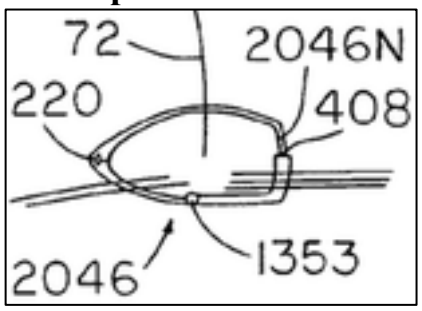
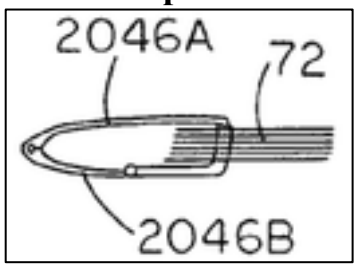


FIG. 59B
Compressed



The District Court found that both sides of FIG. **59** have a "thicker portion." (A0018). That may be, but that is not what the claim requires. The claim requires a "column-like" thick portion. The left side is not "column-like." And even if it is, the part that is "column-like" is just a small sliver of the thicker part. Indeed, this embodiment is described in the patent as "roughly triangular." (A0156 col. 59:59-62). That is evident from the figure itself—the left side of the ring is one of the points of the triangle. Even if the ring is "conspicuously a rounded triangle," as suggested by the District Court (A0018), that does not detract from the fact that the thicker portion of the left side is not "column-like".

FIG. **59** differs from other embodiments in another important respect. Unlike FIGS. **55**A-**55**B—which expressly call out the opposing column-like thick portions with the letter P and Q—FIG. **59** does not do that. (A0126). Rather, these rings are described as having plural column-like thick portions, but those plural

portions are not expressly identified as being on opposite sides of the ring. No letters P and Q or any other demarcations are used to identify opposing column-like thick portions.

To support its construction, the District Court speculated that "column-like thick portions" must be on both sides of the ring because, otherwise, "it is unclear why the flattening and widening would happen; instead, the unsupported side of the bow-like portion would be expected to bend downward**.**" (A0017) (emphasis added). Yet, this was simply speculation. It was not supported by any intrinsic or extrinsic evidence. In fact, FIG. **59**B suggests otherwise.

In FIG. **59**B, the *left* side of the ring is not "column-like". Indeed, the ring is described in the patent as "roughly triangular." (A0156 col. 59:59-62). Yet, the ring still functions as required by the claim. The thin upper and lower portions flatten and widen out. And that flattening by the upper and lower portions accomplishes *most* of the compressibility. Meanwhile, the right side of the ring does not buckle. Rather, it stays rigid. And the reason the left side does not "bend downward," as speculated by the District Court, is clear from the figure—because the column-like thick portions on the *right* side do not buckle. And this is precisely what is required by the claim: the "column-like thick portions resist permanent buckling" under vertical pressure. (A0158 col. 64:61-62).

The District Court faulted Chizmar's construction for not being allegedly apparent in any of the example embodiments. Specifically, the District Court claimed that Chizmar argued "that the thick portions adjoin each other" without specifying "where the first portion ends and where the second begins, or why they should be considered separate portions." (A0018). But, it is improper to confine claims to the specifically-disclosed examples where there is no evidence those examples are intended to be strictly coextensive with the claim. *Varco, L.P. v. Pason Sys. USA Corp.*, 436 F.3d 1368, 1375 (Fed. Cir. 2006). That evidence comes in the form of lexicography or disclaimer—i.e., evidence that the patentee wished the examples to set the confines of the claim. *See Thorner*, 669 F.3d at 1365; *GE Lighting Solutions,* 750 F.3d at 1309. Here, despite acknowledging that its construction was a departure from the claim plain and ordinary meaning (A0016), the District Court identified no lexicography or disclaimer. In the absence of that evidence, the District Court's construction was error.

In sum, the District Court identified no lexicography or disavowal to justify departing from the plain and ordinary meaning of "roughly-vertical column-like thick portions." And its speculation regarding how the ring would otherwise behave if the column-like thick portions were on one side of the ring only is undermined by embodiments within the specification. The District Court therefore

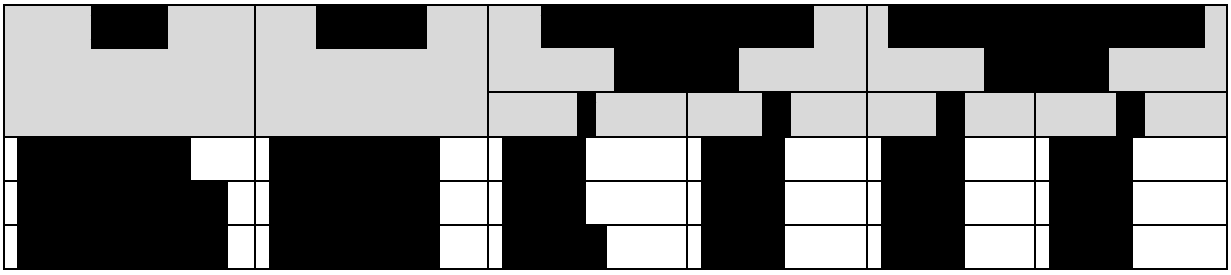
erred by construing the "column-like thick portions" must be on opposite sides of the ring.

C. Under the proper construction of "roughly-vertical column-like portions", the Flex Binders literally infringe Claim 17 of the '640 Patent.

As discussed above, the District Court erroneously construed the "column-like thick portions" must be on opposite sides of the ring. Based on this erroneous construction, the District Court found none of the accused Flex Binders infringe Claim 17 of the '640 Patent. (A0019). Under the proper construction of "column-like thick portions", which does not require those portions are on opposite sides of the ring, Chizmar proffered evidence of infringement that the accused Flex Binders infringe, as demonstrated below. (A0332-334).

REDACTED

Below are thickness measurements of the relevant portions of the rings. These measurements are "height" measurements, as defined in the District Court's opinion. (A0019).



Because the District Court's finding of noninfringement was based upon an erroneous claim construction, that finding was error.

II. THE JUDGMENT THAT THE '140 PATENT IS INVALID BECAUSE IT CANNOT CLAIM THE BENEFIT OF THE '640 PATENT SHOULD BE REVERSED.

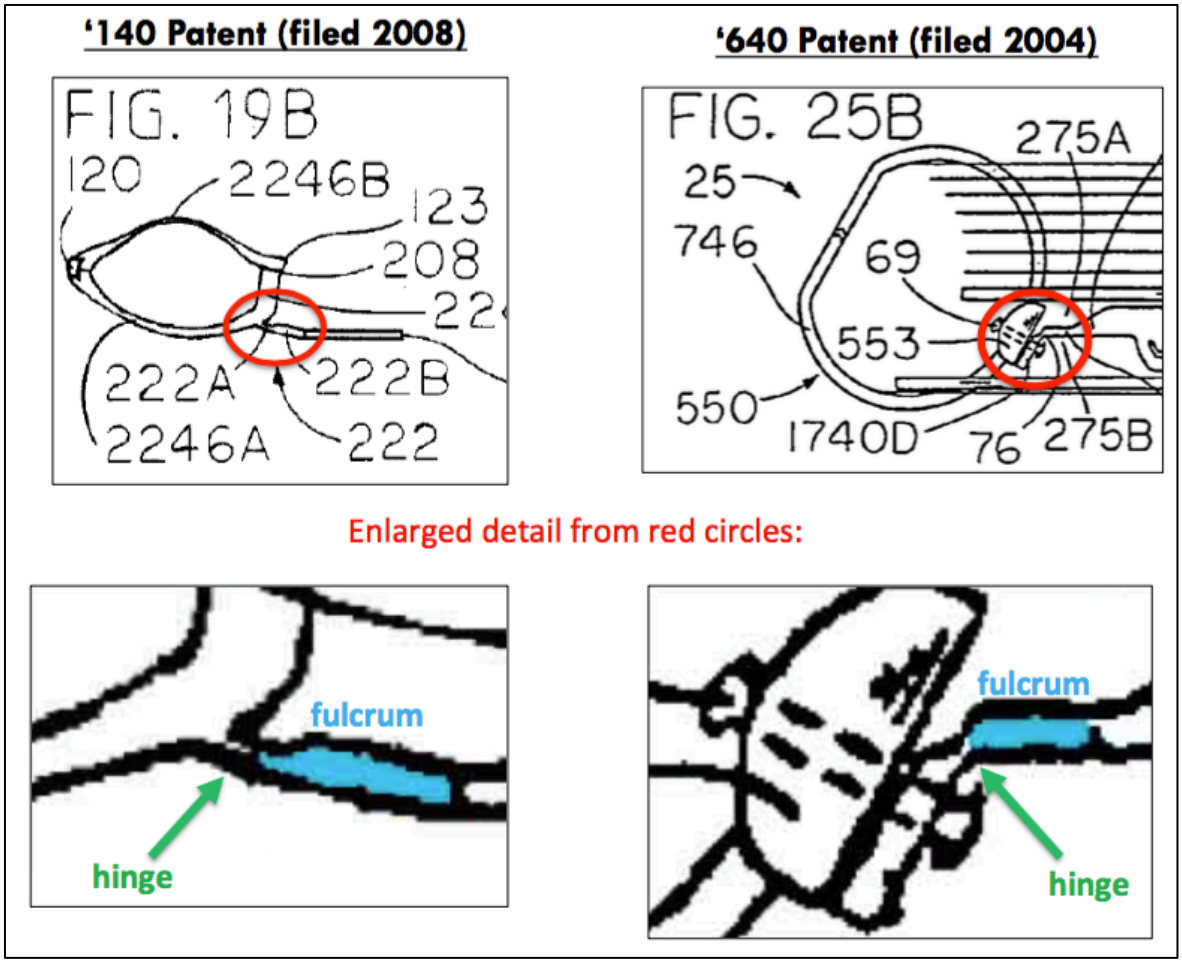
Chizmar does not dispute that the phrase "elastic pivot" does not appear in the '640 Patent. (A0009). Chizmar also does not dispute that the '140 Patent is a continuation-in-part of the earlier '640 Patent. (A0044). And Chizmar does not dispute that the phrase "elastic pivot" first appears in the later '140 Patent.

However, these facts do not preclude a finding that the "elastic pivot" was adequately described in the earlier '640 Patent. This Court has held that "the earlier application need not describe the claimed subject matter *in precisely the same terms* as found in the claims at issue." *Videotek*, 545 F.3d at 1331 (emphasis added). Rather, the "test for sufficiency of support in a parent application is whether the disclosure of the application relied upon reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject

matter." *Martek Biosciences Corp. v. Nutrinova, Inc.*, 579 F.3d 1363, 1369 (Fed. Cir. 2009) (citations omitted).

A. FIG. 25 of the '640 Patent teaches an "elastic pivot".

The '140 Patent illustrates the elastic pivot in FIG. **19**B. The patent states: "Elastic pivot **22** comprises elastic hinge **222**A and fulcrum **222**B. Fulcrum **222**B contributes to rotation of rings **2246** about edge-fold **2640** via cantilever bending." (A0075 col. 29:65-67). Depicted below is a comparison of FIGS. **19**B from the later '140 Patent (A0060) with FIG. **25**B from the earlier '640 Patent (A0110). The relevant portions of these figures are annotated and enlarged to allow easier comparison between the structure of the two figures.



The preferred embodiment of an elastic pivot includes a **hinge**, a **fulcrum**, and **cantilever bending** of that fulcrum. Each feature is discussed separately below.

Hinge: The District Court did not dispute that FIG. **25** discloses a hinge. FIG. **25** discloses a hinge, namely "hinge joint **76**". (A0142 col. 31:54). The hinge is the green highlighted portion above. However, the District Court found that "hinge joint" **76** is not elastic. The District Court stated: "Crucially, it is not disclosed to be elastic." (A0010). This was error for two reasons.

First, the "hinge joint" can be made of elastic material. The "hinge joint" is located in the back cover of the binder. (A0142 col. 31:54-55; A0110 FIG. **25**A-**25**B ("hinge joint **76**" is located "between back cover portions **1740**D and **1740**C")). The '640 Patent teaches that the back cover is "typically made of cardboard, plastic, or other semi-rigid material." (A0134 col. 15:7-8). The District Court acknowledged that this teaches elastic material. The Court stated: "Material that is semi-rigid is of course elastic to a degree." (A0010).

However, the District Court found that the patent teaches cardboard, plastic, or other semi-rigid material for the back cover in connection with FIG. **1**, but not FIG. **25**. (A0011). But that does not necessarily mean that no reasonable juror would find back cover portion **1740**C in FIG. **25** can be made of "semi-rigid material." Importantly, FIG. **25** does not teach that its cover is made of any alternative materials, or limited to rigid materials. The District Court did not identify any other materials described in FIG. **25**, or identify any teaching that back cover cannot be made from semi-rigid material. Indeed, the District Court acknowledged the possibility that "a person of ordinary skill in the art would make the link between the two descriptions," i.e., FIG. **1** and FIG. **25.** (A0011).

The District Court cited *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571-72 (Fed. Cir. 1997). (A0011). But in *Lockwood*, claim limitations were utterly missing from the patent disclosure, such as "individual merchandising

apparatus that contained video disk players". *Id.* at 1572. This is not such a case. The patent expressly teaches that back cover portions can be made from semi-rigid materials. (A0134 col. 15:7-8). The first embodiment comprehensively discloses miscellaneous features of a preferred binder, including materials of the cover, followed by alternate embodiments. Thus, to find that FIG. **25**'s cover can be made of semi-rigid material is not "an obvious variant of that which is disclosed in the specification," *Lockwood*, 107 F.3d at 1572, because it actually is disclosed in the application.

Second, the "hinge joint" is elastic under the District Court's definition of the term "elastic". The District Court found that the word "elastic" means "[c]apable of sustaining deformation without permanent loss of size or shape." (A0010). The patent states, "skeleton **550** rotates relative to front cover **44** and most of back cover **1740** via a hinge joint **76** between back cover portions **1740**D and **1740**C." (A0142 col. 31:53-55). Accordingly, the "hinge joint" sustains deformation. And when the skeleton rotates back, it does not permanently lose size or shape. Indeed, that is inherent in a binder that will be repeatedly opened and closed. Thus, the District Court erred by finding the "hinge joint" is not elastic under its very definition of that term.

Instead, the District Court reasoned the hinge joint is not elastic because "the hinge joint is simply a linear notch along which the cover can fold." (A0010). But

a linear notch along which a cover can fold is unquestionably "capable of sustaining deformation without permanent loss of size or shape." Nothing in the District Court's analysis suggests it is not.

The District Court appears to have erroneously presumed that only plastic components can be elastic. This is evident from the District Court's interpretation of the prosecution history. During prosecution of '140 Patent, Chizmar stated: "Applicant discerns an elastic pivot as a pivot integrally joined between two components like the hinge-joint of the elbow that is between the upper arm and forearm or like a fold between two portions of a sheet of paper." (A0012). The District Court reasoned that "[a]s the elbow example shows, not all hinge joints are elastic . . . ." (A0026). However, the District Court's definition of "elastic" is "[c]apable of sustaining deformation without permanent loss of size or shape." (A0010). Under that definition, an elbow is, in fact, elastic. It is capable of "sustaining deformation" and "without permanent loss of size and shape".

The District Court misapplied its own definition of the word "elastic." That misapplication led to its finding that the "hinge joint" is not elastic. (A0010). Thus, its finding that FIG. **25** does not include an elastic hinge was error.

Fulcrum: The District Court did not dispute that FIG. **25** includes a fulcrum. The "fulcrum" is highlighted above in blue, and it is back cover portion **1740**C. (A0110).

Back cover portion **1740**C is not expressly described in the '640 Patent as a "fulcrum". However, it is attached to the hinge joint **76** in the same way "elastic hinge **222**A" is attached to "fulcrum **222**B" in FIG. **19** of the '140 Patent.

Notably, the '140 Patent teaches that "fulcrum **222**B is joined to the bottom ring segment **2246**A via elastic-hinge **222**A near the side of the ring **2246** that is adjacent to edge-fold **2640**A." (A0075 col. 29:67-30:6). Likewise, in FIG. **25** of the '640 Patent, back cover portion **1740**C is also "joined to the bottom ring segment [**746**] via elastic-hinge [**76**] near the side of the ring [**746**] that is adjacent to [near-ring edge of back cover portion **1740**C]." (A0075 col. 31:45-57; A0110).

Cantilever bending: The District Court found that "[t]here is no disclosure of cantilever bending by any portion of the hinge joint." (A0011). The District Court reasoned, "the portion of Figure 25B that Chizmar identifies as the 'fulcrum' (labeled 1740C) is not shown to bend when the rings are in their rotated position." (A0025).

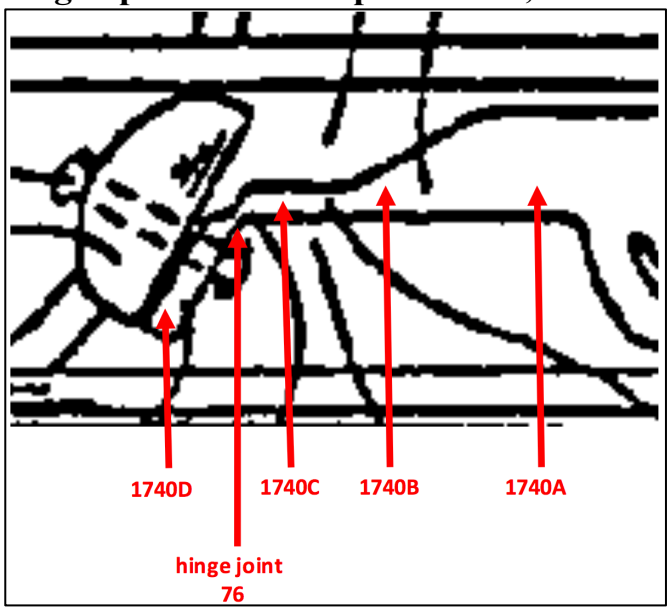
Importantly, Chizmar did not have the opportunity to respond to this argument because it was made by Defendants for the first time on rebuttal during oral argument. (Defendants' summary judgment briefs and relevant portions to the oral argument transcript are available at A0213-243; A0275-295; A0410-416).

The District Court overlooked intrinsic evidence in the '640 Patent showing an issue of fact exists as to whether FIG. **25** teaches cantilever bending. First, the

drawings in a patent are not required to illustrate every feature of an invention. *Arlington Indus. v. Bridgeport Fittings, Inc.*, 632 F.3d 1246, 1254 (Fed. Cir. 2011) ("drawings in a patent need not illustrate the full scope of the invention."). Indeed, FIG. **19** from the later '140 Patent unequivocally depicts the "elastic pivot," yet it does not illustrate actual cantilever bending. (A0060).

More importantly, both the *structure* and *material* of back cover portion **1740**C teach it can bend like a cantilever. As to the *structure*, the portion identified above as the "fulcrum" in FIG. **25** is thinned out. Specifically, back cover **1740**C is thinner than adjacent back-cover portions. This is evident by comparing **1740**C with **1740**A below. (A0110).

FIG. 25B
(enlarged portion of components 76, 1740A-D)



Back-cover portion 1740C is described as having reduced thickness. The patent states, "[b]ack cover portions 1740C-1740D are of **reduced thickness**

relative to back cover portions 1740A . . . ." (A0142 col. 32:4-6) (emphasis added). The patent teaches that similar areas of "**reduced thickness**" are described as facilitating flexibility. For instance, FIG. **23** states, "[t]he **reduced thickness** of middle cover portion 1842B also facilitates its greater flexibility relative to middle cover portions 1842A and 1842C . . . ." (A0141 col. 29:47-49) (emphasis added). And FIG. **53**E states, "[c]onduit casing 914B is **reduced in thickness** for increased flexibility to act like a hinge . . . ." (A0154 col. 55:65-67) (emphasis added).

Thus, the '640 Patent repeatedly teaches that areas of reduced thickness impart flexibility. FIG. **25** does not disclaim that teaching with respect to back-cover **1740**C. Thus, because it is taught to be flexible, a reasonable juror could conclude that **1740**C can bend like a diving board,[3] and thus exhibit cantilever bending. (A0010 n.4).

The *material* of **1740**C also shows it can bend like a cantilever. The '640 Patent teaches that the back cover is "typically made of cardboard, plastic, or other semi-rigid material." (A0134 col. 15:7-8). That includes the *same* material (plastic) that the fulcrum of the elastic pivot in FIG. **19**B of the '140 Patent is made of. (A0075 col. 29:55-56). Thus, the '640 Patent discloses a fulcrum made of the *same* material as the elastic pivot's fulcrum in the '140 Patent.

[3] The District Court found that "[a]n example of cantilever bending occurs when a diving board bends as the person walks to the end of it." (A0010 n.4).

In sum, FIG. **25** of the '640 Patent teaches a fulcrum **1740**C. The fulcrum's structure is an area of "reduced thickness", which imparts flexibility. And it can be made of "plastic", which is the same material taught by the '140 Patent to impart cantilever bending. Thus, a reasonable juror could find fulcrum **1740**C can bend like a diving board. Thus, it can exhibit cantilever bending. Thus, an issue of fact exists that FIG. **25** of the '640 Patent adequately describes the structure of an "elastic pivot." Thus, it was error for the District Court to conclude otherwise.

B. FIG. 54 of the '640 Patent teaches an "elastic pivot".

Chizmar also relied upon FIG. **54** of the '640 Patent as description for the "elastic pivot." However, the District Court found that this embodiment did not use the materials of the cover itself to rotate the rings. The District Court stated, "the rotation of the rings relative to the back cover appears to be achieved primarily by 'rotatably disposing' the spine of the rings fixture inside a 'conduit casing' that is attached to the cover." (A0011 n.5). Thus, even though this figure discloses a "hinge-like portion", the District Court found that it does "not serve the same function [in FIG. **54**] as the elastic pivot does in Claim 20 of the '140 Patent." (*Id.*).

This was error. Even if FIG. **54** teaches that the ring rotates by a spine, the District Court overlooked additional disclosure showing that the ring also rotates by a hinge and cantilever bending of a fulcrum. Importantly, Chizmar did not have

the opportunity to respond to this argument because it was made for the first time in the District Court's opinion. (Defendants' briefs on summary judgment are available at A0213-243; A0275-295, and did not make this point.)

FIG. **54** admittedly does show ring rotation via the spine inside the conduit casing. But that is not the only way it teaches rotation. The patent *also* states that rotation happens via the "hinge-like portion **1014**A." (A0155 col. 57:45-46). Indeed, the patent teaches that when the binder is open 360 degrees, the hinge-like portion enables the conduit casing to "dangle or droop". (A0155 col. 57:62-66). And by dangling or drooping, it is "fairly flush with the flat formation of cover **3403**." (A0155 col. 57:62-66). To be "fairly flush" with the cover's flat formation means that the rings rotated. This is evident in the figures below, which show the ring rotating as well as the dangling and drooping of the conduit casing.

FIG. 54H

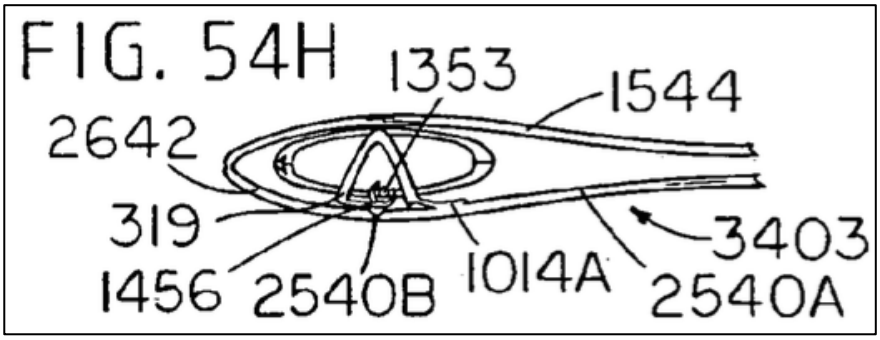
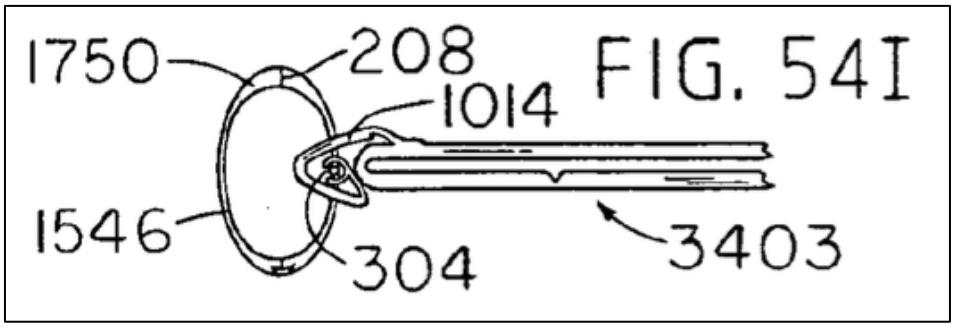


FIG. 54I



Accordingly, FIG. **54** teaches that the conduit casing "dangles or droops" to rotate the rings. The patent also teaches that "conduit casings" can be made of plastic, cardboard or fairly flexible material—thus, the "hinge-like portion" is elastic. (A0150 col. 48:28-30; A0154 col. 55:12-13). Thus, an issue of fact exists that FIG. **54** includes a "hinge-like portion" **1014**A and fulcrum **1014** made of plastic that "dangles or droops", and thus exhibits cantilever bending. It was error for the District Court to conclude otherwise. The District Court's finding that FIG. **54** only teaches rotation through rotation of the spine, and therefore could not describe an "elastic pivot", was error.

* * *

These are not esoteric technical concepts. They do not necessarily require the opinion of an expert or person of ordinary skill. *Centricut, LLC v. Esab Group, Inc.*, 390 F.3d 1361, 1369 (Fed. Cir. 2004) ("In many patent cases expert testimony will not be necessary because the technology will be 'easily understandable without the need for expert explanatory testimony.'" (quoting *Union Carbide*

Corp. v. Am Can Co., 724 F.2d 1567, 1573 (Fed. Cir. 1984)). The District Court stated that Chizmar offered no evidence from a person of ordinary skill equating the structure of a "hinge joint" and "elastic pivot." (A0012). However, the technology in this case does not demand that evidence.

In this case, none of the parties solicited expert testimony. [redacted] Defendants also acknowledged that "for simple technologies like this one," expert testimony is not required. (A0295). Defendants made this latter statement in the context of their argument that one of the asserted claims is indefinite, but their own failure to proffer third-party expert testimony for any of their arguments—including their argument that Claim 20 of the '140 Patent was not adequately described in an earlier patent—supports the conclusion that expert testimony was not required.

Likewise, a reasonable juror could apply these technical concepts to conclude the '140 Patent was not invalid. For instance, a reasonable juror could, in fact, conclude that a "linear notch along which the cover can fold" is "capable of sustaining deformation without permanent loss of size or shape". A reasonable juror could, in fact, conclude that an area of reduced thickness, which is made of "cardboard, plastic, or other semi-rigid material" would be bendable, like a diving board. A reasonable juror could, in fact, conclude that a hinge that rotates and

rotates back is elastic. By finding that no reasonable juror could have answered these questions affirmatively, and thus that no issue of fact existed, the District Court committed reversible error.

C. The District Court erroneously relied upon the disjunctive "or" recited in Claim 20 of the '140 Patent.

The District Court placed great emphasis on the fact that there is a disjunctive in the claim in the course of determining the "hinge joint" cannot describe an "elastic pivot". Claim 20 of the '140 Patent recites "at least one elastic pivot **or** hinge joint." (A0078 col. 36:43) (emphasis added). The District Court found: "Claim 20's use of the disjunctive 'or' indicates that Chizmar understood the two terms to refer to two different structures." (A0012). This finding was error for two reasons.

First, the intrinsic evidence shows that Chizmar in fact understood an "elastic pivot" and "hinge joint" to refer to the *same* structure. On two occasions during prosecution of the '140 Patent, Chizmar informed the Examiner that Claim 20 of the '140 Patent was supported by written description from the '640 Patent—including FIG. **25**. He did so once during an examiner interview (A0401), and then again in response to an office action (A0403-A0404).[4]

[4] It is undisputed that FIGS. **25**A-**25**B in the '749 Patent are identical to FIGS. **25**A-**25**B in the '640 Patent. (A0013). It is also undisputed that Claim 21 during prosecution eventually issued as the asserted Claim 20. (*Id.*).

Second, the District Court cited *SkinMedica, Inc. v. Histogen Inc.*, 727 F.3d 1187, 1200 (Fed. Cir. 2013). (A0012). That case cites to *Thorner*, 669 F.3d at 1368. The District Court relied upon *Thorner* for the proposition that using "two terms as alternatives in a claim can sometimes amount to an implicit redefinition of the terms" as long as "the 'implied' redefinition must be **so clear** that it equates to an **explicit one**." (A0012, quoting *Thorner*, 669 F.3d at 1368) (emphasis added). Based on this, the District Court concluded that "Chizmar has offered no evidence that a person of ordinary skill in the art would read Claim 20 as defining 'elastic pivot' to mean the same thing as 'hinge joint.'" (A0012).

However, the opposite is true. The District Court misread *Thorner*. Indeed, *Thorner* supports the proposition that reciting terms in the alternative does not redefine those terms to be different unless that "implied" redefinition is **so clear** that it is **explicit**. The use of the disjunctive *by itself* cannot provide that explicit disavowal or lexicography.

CONCLUSION AND STATEMENT OF RELIEF SOUGHT

For the foregoing reasons, this Court should reverse the finding of noninfringement of Claim 17 of the '640 Patent under the doctrine of equilvalents, adopt Chizmar's proposed construction of the "roughly-vertical column-like thick portions", and reverse the invalidation of Claim 20 of the '140 Patent.

Respectfully submitted,

Dated: August 10, 2015

/s/ Zachary D. Silbersher
Zachary D. Silbersher
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Attorneys for Appellant
JAMES S. CHIZMAR

ADDENDUM

TABLE OF CONTENTS FOR ADDENDUM

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

JAMES S. CHIZMAR,

Plaintiff,

v.

ACCO BRANDS CORPORATION, AND STAPLES, INC.

Defendants.

No. 14 CV 2181

AGREED PROTECTIVE ORDER AND ADDENDUM

Pursuant to Federal Rule of Civil Procedure 26(c), Plaintiff James S. Chizmar ("Chizmar"), Defendant ACCO Brands Corporation ("ACCO"), and Defendant Staples, Inc. ("Staples") (collectively, the "Parties," and separately, "Party")[1], hereby stipulate to the entry of this Agreed Protective Order for the protection of certain limited confidential, proprietary, or private information which may be produced or otherwise disclosed during the course of this litigation. The Parties agree that good cause exists for this Agreed Protective Order to preserve and maintain the confidentiality of certain limited confidential, proprietary, or private information that has not been released to the public, but which may be disclosed during discovery, in court filings, at hearings, or during trial in this matter and which the Parties desire to remain confidential. The Parties further agree that good cause exists for this Agreed Protective Order to permit discovery to proceed in an expeditious and productive manner. Therefore, the Court specifically finds that good cause exists for this Agreed Protective Order and HEREBY ORDERS AS FOLLOWS:

[1] ACCO and Staples are collectively referred to herein as "Defendants."

DEFINITIONS

1. The term "Discovery Material" as used herein includes without limitation any item, information, document, thing, sample, discovery response, pleading, or testimony, regardless of whether in hard copy or electronic format, and regardless of whether in whole or in part, that is produced, disclosed or generated in connection with this action.

2. The term "outside counsel" or "outside attorney" refers to the Parties' respective counsel of record in this action and attorneys employed by the same law firm of counsel of record.

3. The term "in-house counsel" refers to attorneys who are employees of a Party.

4. The term "Confidential" means any Discovery Material that is personal, private, and/or generally not disseminated information which either or both of the Parties have treated as confidential so as to limit access thereto. For example, "Confidential" Discovery Material includes: (a) information prohibited from disclosure by statute; (b) research or technical information relating to products that the Parties have maintained as confidential; (c) personally identifying information of a sensitive nature; and (d) personnel or employment records of a person who is not a party to the case. Any Discovery Material derived from the foregoing, including copies, descriptions, summaries, and abstracts, are also considered "Confidential."

5. The term "Confidential — Outside Attorneys' Eyes Only" means Confidential Discovery Material of a highly sensitive nature relating to (1) highly sensitive financial information, including financial planning, financial performance, marketing plans, business plans, competitive strategies, and business relationships; (2) highly sensitive technical information about the design, structure, composition, or operation of the parties' products; (3) research, development, and production of future products, including those presently in

development; and (4) information that reveals trade secrets. Any Discovery Material derived from the foregoing, including copies, descriptions, summaries, and abstracts, are also considered "Confidential — Outside Attorneys' Eyes Only."

SPECIFIC PROVISIONS

6. This Agreed Protective Order shall govern the disclosure and use of Confidential Discovery Material produced in connection with this matter by either of the Parties and by non-parties from which either of the Parties solicits third-party discovery. This Agreed Protective Order is necessary to preserve the legitimate confidentiality, proprietary, and privacy interests of the Parties over Discovery Material; to establish a procedure for disclosing such Discovery Material to the Parties in this matter; and to impose obligations on persons receiving such information to protect it from unauthorized use or disclosure.

7. Discovery Material produced subject to the terms of this Agreed Protective Order shall be designated as "Confidential" by stamping "CONFIDENTIAL" clearly on each page of the document in a manner that will not interfere with the document's legibility.

8. Discovery Material produced subject to the terms of this Agreed Protective Order shall be designated as "Confidential — Outside Attorneys' Eyes Only" by stamping "CONFIDENTIAL — OUTSIDE ATTORNEYS' EYES ONLY" clearly on each page of the document in a manner that will not interfere with the document's legibility.

9. All Discovery Material which is or has been produced or discovered in this matter, regardless of whether designated "Confidential," "Confidential — Outside Attorneys' Eyes Only," or not provided with any designation at all — shall be used solely for the prosecution or defense of this matter unless the Discovery Material is available to the general public without a breach of the terms of this Agreed Protective Order.

10. "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material shall not be exhibited, disseminated, copied, or in any way communicated to anyone for any purpose whatsoever, other than in conjunction with and in furtherance of the claims or defenses for the above-captioned matter, and shall otherwise not be used for any other purpose. Except as provided for in this Agreed Protective Order, the Parties shall keep all "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material covered by the terms of this Agreed Protective Order from all persons as provided for by the terms of this Agreed Protective Order.

11. Neither Party (*i.e.*, Plaintiff or Defendants) in receipt of Confidential Discovery Material, nor representatives thereof shall share and/or disclose such Discovery Material designated as "Confidential," other than to the following persons:

(a) Outside counsel for the Parties in this action and their assistants, associates, paralegals, clerks, stenographic personnel, and those individuals specifically acting at the direction of counsel, including contractors engaged for processing and reviewing documents;

(b) In-house counsel for the Parties in this action and their assistants, associates, paralegals, clerks, stenographic personnel, and those individuals specifically acting at the direction of counsel, including contractors engaged for processing and reviewing documents;

(c) Independent experts and consultants retained by either of the Parties whose assistance is necessary for the preparation of trial of this action, and provided that such persons read and sign an undertaking in the form attached hereto as Appendix A; and

(d) Any judicial officer and/or mediator who may preside over this matter, (including any agent of such individuals) and any court reporter used during depositions or other proceedings.

12. Neither the receiving Party nor its representatives shall share and/or disclose such Discovery Material designated as "Confidential — Outside Attorneys' Eyes Only," other than to the following persons:

(a) All outside counsel for the Parties in this action and their assistants, associates, paralegals, clerks, stenographic personnel, and those individuals specifically acting at the direction of counsel, including contractors engaged for processing documents and facilitating review of documents produced in the above-captioned matter;

(b) Independent experts and consultants retained by either of the Parties whose assistance is necessary for the preparation of trial of this action, and provided that said employees read and sign an undertaking in the form attached hereto as Appendix A; and

(c) Any judicial officer and/or mediator who may preside over this matter, (including any agent of such individuals) and any court reporter used during depositions or other proceedings.

13. A Party in receipt of materials designated by the producing Party as "Confidential" or "Confidential — Outside Attorneys' Eyes Only" shall not be obligated to challenge the propriety of any such designation at the time the designation is made, and a failure to do so shall not preclude a subsequent challenge thereto. In the event that any Party to this matter disagrees at any point with any designation made under this Agreed Protective Order, the Parties shall first try to dispose of such dispute in good faith on an informal basis. If the dispute

cannot be resolved, the Party objecting to the designation may seek appropriate relief from the Court. The Discovery Material in dispute shall be kept as "Confidential" or "Confidential — Outside Attorneys' Eyes Only," as applicable, unless and until the dispute is resolved.

14. To the extent "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material is used as exhibits or attachments to any filing with the Court in the above-captioned matter, such Discovery Material shall be filed under seal. The parties will use their reasonable best efforts, including by conferring with one another in good faith, to minimize the filing of Discovery Materials under seal.

15. Any Discovery Material produced or disclosed by a non-party pursuant to a subpoena or otherwise in the above-captioned matter shall be covered by the terms of this Agreed Protective Order by marking or identifying such Discovery Material pursuant to the terms of this Agreed Protective Order, including by designating Discovery Material as "Confidential" or "Confidential – Attorneys' Eyes Only." Any Party may designate any materials produced in this Action by a non-party as "Confidential" or "Confidential – Attorneys' Eyes Only" under the terms of this Agreed Protective Order. Any non-party shall indicate its agreement to be bound by this Agreed Protective Order by reading and signing the undertaking in the form attached hereto as Appendix A before producing Discovery Material in connection with the above-captioned matter or before being provided with "Confidential" or "Confidential – Attorneys' Eyes Only" Discovery Material produced in connection with the above-captioned matter.

16. A Party may designate information disclosed during any deposition in this matter as "Confidential" or "Confidential — Outside Attorneys' Eyes Only" by notifying all Parties either during the deposition or, in writing, within thirty (30) days of receipt of the "final official

transcript", of the specific pages and lines of the transcript which contain "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material. All deposition transcripts not previously designated shall be deemed to be, and shall be treated as "Confidential—Outside Attorneys' Eyes Only" for a period of thirty (30) days of receipt of the "final official transcript" of the deposition, and the transcript shall not be disclosed during such time by a receiving Party to persons other those persons qualified to receive such information pursuant to this Agreed Protective Order.

17. If a Party intends to use deposition transcripts or deposition excerpts as exhibits or attachments to any filing with the Court in the above-captioned matter prior to the expiry of the 30 day period referenced in paragraph 16, the Party shall undertake a good faith examination of the testimony to determine whether the testimony contains "Confidential" or "Confidential — Outside Attorneys' Eyes Only" information as to the Party. If so, the Party shall file the deposition transcript or deposition under seal. The Party shall also confer, prior to its filing, with the other Party to allow the other Party to determine whether the testimony contains "Confidential" or "Confidential — Outside Attorneys' Eyes Only" information as to the other Party. If the other Party represents that the testimony does contain "Confidential" or "Confidential — Outside Attorneys' Eyes Only" information as to the other Party, the Party filing the deposition transcripts or deposition excerpts will file such materials under seal.

18. In the event that counsel for either of the Parties believes it is necessary to disclose any Discovery Material designated by the other Party as "Confidential" or "Confidential — Outside Attorneys' Eyes Only" to anyone not authorized to receive such Discovery Material under this Agreed Protective Order, then at least ten (10) days prior to making a disclosure to such person(s), counsel for the Party desiring to do so shall give written notice thereof to the

other Party, which notice shall identify the person(s) to whom disclosure is to be made and describe the "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material intended to be disclosed to such person(s). If the Party who had designated the information as "Confidential" or "Confidential — Outside Attorneys' Eyes Only" objects to said disclosure of its information, it shall notify the Party desiring to make such disclosure of its objection in writing within the ten (10) day period. The Parties shall attempt to resolve any objections informally. If objection is made, then any Party may bring before the Court the question of whether the Discovery Material in question may be disclosed to a party not authorized to receive such Discovery Material. In the event objections are made and not resolved informally, disclosure of Discovery Material to the party not authorized to receive such Discovery Material shall not be made except by Order of the Court (or to any limited extent upon which the Parties may agree).

19. If the counsel for either of the Parties desires to disclose information designated by the other Party as "Confidential" or "Confidential — Outside Attorneys' Eyes Only" to any expert or consultant pursuant to Paragraphs 11 or 12, then at least ten (10) days prior to making a disclosure, counsel for or the Party desiring to do so shall give written notice thereof to the other Party, which notice shall identify the expert or consultant and his/her affiliation, and an up-to-date curriculum vitae identifying at least all other present and prior employments of the expert or consultant, and a list of the cases in which the expert or consultant has testified at a deposition or trial within the last five years. If the Party who had designated the information as "Confidential" or "Confidential — Outside Attorneys' Eyes Only" objects to said disclosure of its information, it shall notify the Party desiring to make such disclosure of its objection in writing within the ten (10) day period. The Parties shall attempt to resolve any objections informally. If objection is

made, then any Party may bring before the Court the question of whether the Discovery Material in question may be disclosed to the expert or consultant. In the event objections are made and not resolved informally, disclosure of Discovery Material the expert or consultant shall not be made except by Order of the Court (or to any limited extent upon which the Parties may agree). If an expert or consultant who receives "Confidential" or "Confidential — Outside Attorneys' Eyes Only" later wishes to be retained or hired by a direct competitor of the producing Party to perform work or provide services relating to technology or products involved in or at issue in this case, said expert or consultant shall ensure that the producing Party receives actual, advance notice of their intent to do so, and an opportunity to move for an appropriate Court order to protect the producing Party's confidentiality rights. This obligation will continue until two years after the termination of this litigation, including any appeals.

20. Any interested member of the public may apply to the Court in which this matter is pending at any time to unseal "Confidential" or "Confidential — Outside Attorneys' Eyes Only" information which was filed under seal. If the Party opposing the unsealing of "Confidential" or "Confidential — Outside Attorneys' Eyes Only" information fails to demonstrate that good cause exists for maintaining the "Confidential" or "Confidential — Outside Attorneys' Eyes Only" information under seal, the Court will order the "Confidential" or "Confidential — Outside Attorneys' Eyes Only" information to be unsealed.

21. The inadvertent or unintended disclosure pursuant to discovery in this matter of "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material, regardless of whether the information was designated at the time of disclosure, shall not in this action be deemed a waiver in whole or in part of a subsequent claim of protected treatment under this Agreed Protective Order, either as to the specific Discovery Material disclosed or as to any

other Discovery Material, provided that a notification of the discovery of the inadvertent disclosure is made in a timely fashion and prompt written notice of the claim of confidentiality is given.

22. Post-complaint privileged communications and work product related to this action need not be identified on any privilege log.

23. Any Party that mistakenly produces privileged materials may obtain the return of those materials by promptly upon discovery of the error notifying the recipient(s) of the privilege and providing a privilege log for any such materials. The materials shall be returned/destroyed promptly upon notice even if the receiving Party disagrees with the claim of privilege. Thereafter, the receiving Party is free to challenge the validity of the underlying privilege claim on grounds other than waiver via inadvertent production/disclosure.

24. No person shall submit or disclose any "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material, or information derived therefrom, discovered from an opposing party for purposes other than the prosecution or defense of this action, including, without limitation, for the purposes of preparing, filing or prosecuting any patent application, continuation or divisional patent application, reissue patent application or request for re-examination or in any United States Patent and Trademark Office post-grant proceeding, such as reexamination or *inter partes* review, or in any proceeding in a foreign patent office.

25. Upon settlement or exhaustion of all appeals in this Action, all persons to whom "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material have been disclosed shall, upon written demand, either (a) destroy or (b) return to the Party that originally produced it all "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery

Material (for avoidance of doubt, all copies therefore) and all other Discovery Material containing information taken from the "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material within thirty (30) days of the exhaustion of all appeals, except that each Party's litigation counsel may retain copies of pleadings, briefs, motions, and other documents filed in any court that include "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material, and each Party's litigation counsel may retain one complete copy of any outside counsel work files containing "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material. Upon written request, all recipients of "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material shall certify in writing that they have complied with the provisions of this paragraph.

26. All provisions of this Agreed Protective Order shall continue to be binding on the Parties and all persons who have received Discovery Material under this Agreed Protective Order after the conclusion of this action, including all appeals, unless the Parties agree otherwise in writing. If any Party breaches this Agreed Protective Order following the entry of final judgment in this Court, the other Party may bring an action for breach of contract in a court of appropriate jurisdiction for enforcement of the terms of this Agreed Protective Order. The Parties hereby agree that injunctive relief may be appropriate in the event of a breach of this Agreed Protective Order.

WHEREFORE, the Parties, by their respective counsel, hereby agree and stipulate to each of the terms and conditions as set forth in the foregoing Agreed Protective Order.

/s/ Chad Stover Chad Stover Chad.Stover@btlaw.com BARNES & THORNBURG LLP 1000 N. West Street Suite 1500 Wilmington, DE 19801-1050 Telephone: 302-300-3474 Facsimile: 302-300-3456 Shubham Mukherjee smukherjee@btlaw.com BARNES & THORNBURG LLP One North Wacker Drive Suite 4400 Chicago, IL 60606-2833 Telephone: 312-214-5631 Facsimile: 312-759-5646	/s/ Zachary Silbersher Zachary Silbersher (ZS4391) *zsilbersher@kskiplaw.com* Sergey Kolmykov (SK7790) *skolmykov@kskiplaw.com* Gaston Kroub (GK6970) *gkroub@kskiplaw.com* 305 Broadway, 7th Floor New York, NY 10007 Telephone No.: (212) 323-7442 *ATTORNEYS FOR PLAINTIFF* *JAMES S. CHIZMAR*

SUBJECT TO ADDENDUM ORDER

APPROVED on this 15th day of September, 2014.

United States District Court, Southern District of New York

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK
----------x
JAMES S. CHIZMAR

Plaintiff[s],

ADDENDUM TO ORDER
14 Civ. 2181(PKC)

-against-

ACCO BRANDS CORPORATION AND STAPLES, INC

Defendant[s].
----------x

This Addendum is an integral part of the Order of today's date granting confidentiality protection to certain materials. Notwithstanding any other provision, no document may be filed with the Clerk under seal without a further Order of this Court addressing the specific documents to be sealed. Any application to seal shall be accompanied by an affidavit or affidavits and a memorandum of law, demonstrating that the standards for sealing have been met and specifically addressing Lugosch v. Pyramid Co. of Onondaga, 435 F.3d 110, 119-120 (2d Cir. 2006) and any other controlling authority.

Nothing herein is intended to alter or modify the applicability of Rule 5.2, Fed. R. Civ. P., to this case. The redactions expressly authorized by Rule 5.2 may be made without further application to the Court.

SO ORDERED.

P. Kevin Castel
United States District Judge

Dated: New York, NY
9-15-14

APPENDIX A

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

JAMES S. CHIZMAR,	)	
	)	
Plaintiff,	)	
	)	
v.	)	No. 14 CV 2181
	)	
ACCO BRANDS CORPORATION, AND STAPLES, INC.	)	
	)	
	)	
Defendants.	)	

ACKNOWLEDGEMENT OF READING AND
AGREEMENT TO BE BOUND BY AGREED PROTECTIVE ORDER

1. Full name _____

[If indicating agreement to Agreed Protective Order on behalf of third-party entity:]

I am agreeing to enter into this Agreed Protective Order on behalf of _____ and am authorized to provide such assent on its behalf.

2. Address: _____

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3. I have received a copy of the Agreed Protective Order filed in the above-captioned matter; I have carefully read and understand the provisions of the Agreed Protective Order; and I will comply with all of such provisions.

4. I will hold in confidence, will not disclose to anyone not qualified under the Agreed Protective Order, and will use only for purposes of this action, any "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material disclosed to me.

5. I will return all "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material and all copies which come into my possession, and Discovery Material which I have prepared relating thereto, to counsel for the Party by whom I am employed or retained, or from whom I received the "Confidential" or "Confidential — Outside Attorneys' Eyes Only" Discovery Material.

6. I hereby submit to the jurisdiction of the Court in which the above-captioned matter is pending for the purpose of enforcement of the Agreed Protective Order in this action.

Signature: _____

Printed Name: _____

Date: _____

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

----------X

JAMES S. CHIZMAR ,

Plaintiff,

-against-

ACCO BRANDS CORPORATION and STAPLES, INC.,

Defendants.

----------X

14 **CIVIL** 2181 (PKC)

JUDGMENT

Defendants having moved for summary judgment, and the matter having come before the Honorable P. Kevin Castel, United States District Judge, and the Court, on May 8, 2015, having rendered its Memorandum and Order that because claim 20 of the '140 Patent is invalid as anticipated, and because the Flex Binders do not infringe Claim 17 of the '640 Patent, therefore, granting defendants' motion for summary judgment in its entirety, and the Court need not reach the issue on Claim 17's indefiniteness, and directing the Clerk to close the case, it is,

ORDERED, ADJUDGED AND DECREED: That for the reasons stated in the Court's Memorandum and Order dated May 8, 2015, defendants' motion for summary judgment is granted in its entirety; the Court need not reach the issue on Claim 17's; indefiniteness; accordingly, the case is closed.

Dated: New York, New York
May 13, 2015

RUBY J. KRAJICK

Clerk of Court

BY:

Deputy Clerk

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

----------x

JAMES S. CHIZMAR,

Plaintiff,

14-cv-2181 (PKC)

-against-

MEMORANDUM
AND ORDER

ACCO BRANDS CORPORATION and
STAPLES, INC.,

Defendants.

----------x

CASTEL, U.S.D.J.

Plaintiff James S. Chizmar is the owner of U.S. Patent No. 7,347,640 (the "'640 Patent") and U.S. Patent No. 8,277,140 (the "'140 Patent"), which disclose a type of loose-leaf ring binder whose front cover can be folded over to lie flat beneath the back cover. Defendant ACCO Brands Corporation ("ACCO") produces and sells, and defendant Staples, Inc. ("Staples") resells the accused products, a line of "hybrid notebinders" that, while functioning like loose-leaf ring binders, also have a front cover that can be folded over behind the back cover (the "Flex Binders").

Chizmar asserts that the Flex Binders infringe the '640 Patent and the '140 Patent. The defendants now move for summary judgment. Because the Court concludes that the asserted claim of the '140 Patent is invalid as anticipated, and that the accused products do not infringe the asserted claim of the '640 Patent, the motion is granted.

BACKGROUND

Chizmar is an individual inventor with a background in mechanical engineering

and computer programing. (Chizmar Dep. 10:7–8, 11:6–21, 19:15–17.) The idea of creating improved notebook or binder products first came to him in 1989, while he was enrolled at Columbia Business School (id. 15:7–16:4), and he developed some prototypes over the next two or three years. (Id. 16:18–18:12.) Due to financial constraints, he did not discuss patenting his invention with a patent attorney until 1997 or 1998. (Id. 29:16–30:2.) He filed for a patent related to his binder invention in April 1999 (id. 39:2–4), and the application matured into U.S. Patent No. 6,196,749 (the "'749 Patent"), which was issued on March 6, 2001. (Id. 40:12–20, 66:4–12.) Chizmar subsequently obtained four more U.S. patents relating to his binder invention, including the '640 Patent and the '140 Patent. (Id. 67:9–22.) Chizmar attempted to market his inventions to ACCO, predecessor entities, and Staples, as well as to other companies throughout the world, but although some companies expressed interest, no deal was ever finalized.[1] (Id. 70:13–76:16.)

The '640 Patent is entitled "Loose-Leaf Binder," and was filed on March 8, 2004 and issued on March 25, 2008. The '140 Patent, also entitled "Loose-Leaf Binder," was filed on September 8, 2008, and issued on October 2, 2012. The '140 Patent claims priority to the '640 Patent and the '749 Patent, as well as two other patents. ('140 Patent col. 1:6–17.) Both patents describe binders with "releasably retaining rings to bind loose-leaf pages permitting easy addition or removal of loose-leaf pages as desired," but whose "front cover [can be] opened . . . 360 degrees relative to the back cover," like a spiral notebook. ('640 Patent col. 5:17–18, 38–40; '140 Patent col. 5:25–26, 46–48.) This feature improves upon conventional binders, which are characterized by "a very large footprint because, during use, the front cover is open 180 degrees

[1] Chizmar recently settled a similar patent litigation with CCL Industries Corp., Avery Products Corp. ("Avery"), and Staples. Stipulation of Voluntary Dismissal, Chizmar v. CCL Indus. Corp., No. 14-cv-2182-GHW (S.D.N.Y. Aug. 28, 2014). (See also Chizmar Dep. 63:15–23.) According to Chizmar, the settlement entailed granting a license to Avery. (Opp'n 3.)

relative to the back cover." ('640 Patent col. 1:41–43; '140 Patent col. 1:53–55.)

ACCO manufactures and sells office products under a number of different brands,[2] and Staples resells some of these products in its stores. In response to consumer dissatisfaction with conventional binders, ACCO developed the Flex Binders, also known as the "Flex Hybrid Notebinders" and marketed under the "Mead Five Star" brand. (Busam Decl. ¶¶ 2, 3.) The first line of Flex Binders, which came in two ring sizes, was approved for production in October 2005 and was offered for sale in January 2006 at the latest. (Defs.' 56.1 ¶¶ 28, 30, 32.) A new line of Flex Binders with a more rounded ring shape, which is the line still available today, was introduced for the 2007 Back-to-School season in two ring sizes, and a third extra-large ring size was added to the line for the 2008 Back-to-School season. (Defs.' 56.1 ¶¶ 38, 40, 46.)

The Flex Binders were designed to "have all the benefits of a binder and all the benefits of a notebook in one product" (Busan Dep. 29:4–6), and were marketed with the slogan "Acts like a notebook. Works like a binder." (Stover Decl. Ex. H.) They have three rings made of a flexible polymer material, which are independently openable and closable with a snap interface. (Defs.' 56.1 ¶¶ 23, 25.) The ring fixtures (i.e., the three rings and the backing portion that is affixed to the binder cover) are injection molded in a single piece. (Defs.' 56.1 ¶ 23.) A designated flexible area at the base of each ring allows a Flex Binder's front cover and contents to be folded over behind the back cover. (Busam Decl. ¶ 4.) The flexible ring material was also intended to improve upon metal binder rings, which "bend, gap, and misalign" (Busam Decl. ¶ 2; Busam Dep. 143:10–12), although ACCO asserts that it also caused the rings to snap open unintentionally when compressed. (Busam Decl. ¶ 6.)

[2] ACCO acquired the Mead brand in 2012. See ACCO Brands Corp., Annual Report (Form 10-K) at 2 (Feb. 28, 2013). For simplicity, "ACCO" also refers to Mead before its acquisition by ACCO.

Chizmar commenced this action on March 28, 2014, asserting that the Flex Binders "fall within the scope of at least claim 17 of the '640 [P]atent and at least claim 20 of the '140 [P]atent." (Compl. ¶ 14.) On July 10, 2014, this Court ordered that the parties could conduct limited discovery on the issues identified by the defendants in a pre-motion letter, which form the basis for their summary judgment motion. (Dkt. No. 23.) Following the close of the limited discovery period, the defendants moved for summary judgment, on October 31, 2014. (Dkt. No. 32.) The Court held oral argument on the motion on April 27, 2015.

LEGAL STANDARD

Summary judgment "shall" be granted "if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Rule 56(a), Fed. R. Civ. P. A fact is material if it "might affect the outcome of the suit under the governing law . . . ." Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 248 (1986). On a motion for summary judgment, the court must "construe the facts in the light most favorable to the non-moving party and . . . resolve all ambiguities and draw all reasonable inferences against the movant." Delaney v. Bank of Am. Corp., 766 F.3d 163, 167 (2d Cir. 2014). It is the initial burden of the movant to come forward with evidence on each material element of his claim or defense, demonstrating that he is entitled to relief. The evidence on each material element must be sufficient to entitle the movant to relief in its favor as a matter of law. Vt. Teddy Bear Co. v. 1-800 Beargram Co., 373 F.3d 241, 244 (2d Cir. 2004). If the moving party meets its burden, "the nonmoving party must come forward with admissible evidence sufficient to raise a genuine issue of fact for trial in order to avoid summary judgment." Jaramillo v. Weyerhaeuser Co., 536 F.3d 140, 145 (2d Cir. 2008).

"[I]n ruling on a motion for summary judgment, the judge must view the evidence presented through the prism of the substantive evidentiary burden." Anderson, 477 U.S. at 253. Under the patent statutes, a patent enjoys a presumption of validity, 35 U.S.C. § 282, which can be overcome only through clear and convincing evidence. Microsoft Corp. v. i4i Ltd. P'ship, 131 S. Ct. 2238 (2011). When a moving party seeks to invalidate a patent at summary judgment, as the defendants seek to do, the court's inquiry thus becomes "whether the evidence presented is such that a jury applying [the clear-and-convincing] evidentiary standard could reasonably find for" the movant. Anderson, 477 U.S. at 255.

DISCUSSION

The defendants seek summary judgment on three grounds. First, they argue that Claim 20 of the '140 Patent is invalid because the Flex Binders were in public use before the '140 Patent was filed, and because Claim 20 is not entitled to the priority date of the application that led to the '640 Patent. Second, they argue that the Flex Binders do not infringe Claim 17 of the '640 Patent. Third, and alternatively, they argue that Claim 17 of the '640 Patent is invalid as indefinite.

I. Priority Date of Claim 20 of the '140 Patent

A patent is invalid if the claimed invention was "in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States." 35 U.S.C. § 102(b) (2006).[3] The parties agree that the Flex Binders were first offered for sale

[3] Section 102 was rewritten by the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, § 3(b)(1), 125 Stat. 284, 285–87 (2011). The pre-AIA version of the statute continues to govern the validity of patents with effective filing dates earlier than March 16, 2013. Id. § 3(n)(1), 125 Stat. at 293.

over a year before the filing date of the '140 Patent. (Pl.'s Resp. to Defs.' 56.1 ¶ 31). If Claim 20 of the '140 Patent is only entitled to the benefit of the '140 Patent's 2008 filing date, as the defendants maintain, then the claim is anticipated by the Flex Binders, and thus invalid.

Chizmar argues, however, that Claim 20 is entitled, under 35 U.S.C. § 120, to the benefit of the 2004 filing date of the '640 Patent. Section 120 provides that a claim in a later-filed application can obtain the benefit of the filing date of an earlier-filed application to which it claims priority, as long as certain conditions are met. One of these is that the earlier application must sufficiently describe the invention claimed in the later application so as to satisfy the written description requirement of 35 U.S.C. § 112 (other than the requirement to disclose the best mode). To comply with the written description requirement, "the disclosure of the earlier filed application must describe the later claimed invention 'in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.'" Tech. Licensing Corp. v. Videotek, Inc., 545 F.3d 1316, 1331 (Fed. Cir. 2008) (quoting Lockwood v. Am. Airlines, Inc., 107 F.3d 1565, 1572 (Fed. Cir. 1997)).

"Whether the written description requirement is met is a question of fact." Martek Biosciences Corp. v. Nutrinova, Inc., 579 F.3d 1363, 1369 (Fed. Cir. 2009). Once the proponents of invalidity have produced evidence of anticipating prior art, as the defendants have done here by producing the Flex Binders, the patentee must then "produc[e] sufficient evidence and argument to show that an ancestor to the [later] patent, with a filing date prior to the [date when the prior art first became available], contains a written description that supports all the limitations of . . . the claim being asserted." Videotek, 545 F.3d at 1327. The burden of going forward then shifts back to the defendants, who must "convince the court that [Chizmar] is not entitled to the benefit of the earlier filing date," by clear and convincing evidence. Id. at 1328.

Claim 20 of the '140 Patent reads, in relevant part:

> A loose-leaf binder comprising:
> a cover
> a plurality of independently openable elastic binder rings that are each securely closable via a respective interlock closure;
> at least one elastic pivot or hinge joint;
> . . .
> at least a portion of said cover is disposed in a flat formation with a near-ring edge when said cover is open 360 degrees,
> each of said elastic binder rings aligned and attached to said cover adjacent said near-ring edge,
> . . .
> said elastic pivot or hinge joint located adjacent said near-ring edge and enabling a portion of at least one of said elastic binder rings to rotate about said near-ring edge;
> said elastic pivot or hinge joint is disposed flush or flatly relative to said flat formation of said cover to enable a sufficiently smooth surface for writing on ring-bound loose-leaves stacked thereon, and said elastic pivot or hinge joint remaining flush or flat relative to said flat formation when said portion of at least one of said elastic binder rings rotates about said near-ring edge,
> a portion of each of said elastic binder rings rotatable about said near-ring edge to enable each of said elastic binder rings to straddle the two parallel geometric planes respectively containing the top and bottom surfaces of said flat formation of said cover,
> said elastic pivot or hinge joint is roughly axially disposed relative to opposing rotations of said flat formation and said elastic binder rings while said elastic binder rings remain closed,
> whereby ring-bound loose-leaves stacked flatly above said flat formation are substantially parallel to ring-bound loose-leaves stacked flatly below said flat formation when said binder is open 360 degrees and places on a flat surface.

('140 Patent col. 36:37–37:9) (emphasis added). In one embodiment, shown in Figures 19A and 19B, the "elastic pivot" is described as comprising an "elastic hinge . . . and fulcrum," with the fulcrum "contribut[ing] to the rotation of rings . . . about edge-fold . . . via cantilever bending." ('140 Patent col. 29:65–67.) In simpler terms, the elastic pivot allows each ring to bend relative

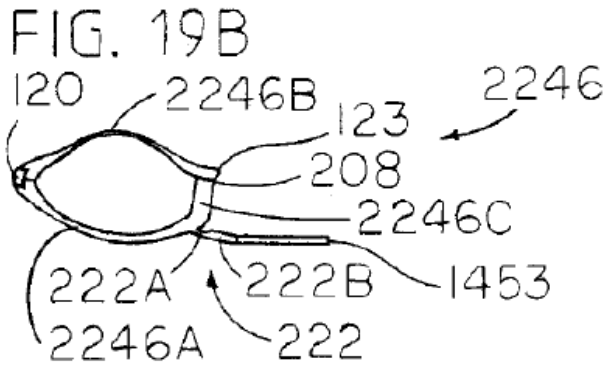

Figure 19B of the '140 Patent. "Elastic pivot 222 comprises elastic hinge 222A and fulcrum 222B." ('140 Patent col. 29:65–66.)

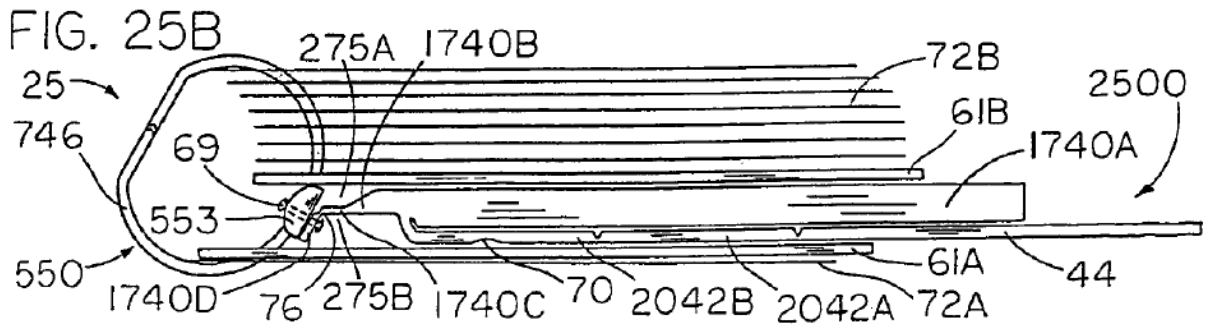

Figure 25B of the '640 Patent, showing the binder in its open position. "[S]keleton 550 rotates relative to front cover 44 and most of back cover 1740 via a hinge joint 76 between back cover portions 1740D and 1740C." ('640 Patent col. 31:53–55.)

to the back cover of the binder, which in turn allows the contents of the binder to flipped over and stacked on the ring behind the back cover.

The parties disagree about whether Claim 20's "elastic pivot" element is adequately described in the '640 Patent. As the defendants emphasize, the term "elastic pivot" appears nowhere in that patent. Chizmar asserts, however, that a preferred embodiment in the '640 Patent specification disclosing a "hinge joint" (illustrated in Figures 25A and 25B) satisfies the written description requirement for the "elastic pivot" element. In that embodiment, the rings are riveted to the back cover, but can rotate relative to it thanks to a "hinge joint" in the back

cover, which appears to be a notch running parallel to and near the edge of the cover that allows the cover to fold. ('640 Patent Figs. 25A, 25B, col. 31:38–32:3.) As Chizmar explains, the hinge joint thus serves the same function at the elastic pivot: "both contribute to the rotations of the rings about the edge of the back cover." (Opp'n 7.)

Chizmar's argument is, in essence, that the '140 Patent's elastic pivot is the same as the '640 Patent's hinge joint. The Court concludes that no reasonable factfinder would agree. Although "the earlier application need not describe the claimed subject matter in precisely the same terms as found in the claims at issue," Videotek, 545 F.3d at 1331, the '640 Patent's hinge joint, as described, cannot fairly be said to fall under the term "elastic pivot." Crucially, it is not disclosed to be elastic. With the elastic pivot, the rotation of the rings is achieved through "cantilever bending" of the fulcrum.[4] The elasticity of the material used is thus integral to its function, as Chizmar himself stated during the prosecution of the '140 Patent. (See Silbersher Decl. Ex. J. at 15 ("The pivot motion of an elastic pivot is enabled by the plasticity or flexibility of the elastic pivot material.").) By contrast, as described in the '640 Patent, the hinge joint is simply a linear notch along which the cover can fold.

Chizmar makes much of the fact that the '640 Patent describes the cover as "typically made of cardboard, plastic, or other semi-rigid material." ('640 Patent col. 15:7–8; see also Oral Arg. Tr. 16:16–17:9.) Material that is semi-rigid is of course elastic to a degree. Compare McGraw-Hill Dictionary of Scientific and Technical Terms 686 (6th ed. 2003) (defining "elastic" as "[c]apable of sustaining deformation without permanent loss of size or shape") with id. at 1816 (defining "rigidity" as "[t]he quality or state of resisting change in

[4] A cantilever is "a projecting beam or member supported at only one end (as by being built into a wall or a pier)." Webster's Third International Dictionary 329 (1993). An example of cantilever bending occurs when a diving board bends as a person walks to the end of it.

form"); see also id. at 1897 (defining "semirigid plastic" as "[a] plastic that has a stiffness or apparent modulus of elasticity of between 10,000 and 100,000 pounds per square inch . . . under prescribed test conditions"). As an initial matter, however, the disclosure on which Chizmar relies appears in the description of Figure 1, not Figure 25. The description of Figure 25 contains no mention whatsoever of elasticity. But even assuming a person skilled in the art would make the link between the two descriptions, the flexibility of the material is not disclosed as playing any role in the functioning of the hinge joint. There is no disclosure of cantilever bending by any portion of the hinge joint. As counsel for the defendants pointed out at oral argument, the portion of Figure 25B that Chizmar identifies as the "fulcrum" (labeled 1740C) is not shown to bend when the rings are in their rotated position. (Oral Arg. Tr. 26:8–13.)

True, the two structures are similar enough that a person skilled in the art reading the '640 Patent's disclosure might have considered an elastic pivot to be an obvious alternative or improvement to the hinge joint (although Chizmar has offered no evidence confirming this). But that is insufficient. "Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed. It extends only to that which is disclosed." Lockwood v. Am. Airlines, Inc., 107 F.3d 1565, 1571–72 (Fed. Cir. 1997).[5]

Reading Claim 20 in the light of accepted principles of claim construction bolsters the conclusion that "elastic pivot" refers to something different from "hinge joint." Claim 20

[5] Chizmar also points to several other embodiments in the '640 Patent that he contends adequately disclosed an elastic pivot. Figures 49B and 49C illustrate "folds" in the back cover which allow the rings to rotate relative to the back cover. ('640 Patent col. 52:24–27.) These appear to be similar in substance to the "hinge joint" from Figures 25A and 25B, and are similarly not disclosed to be elastic. Figures 53E and 54G illustrate a "hinge" or "hinge-like portion" that is attached to the back cover. (Id. col. 55:66–56:1, 57:45–46.) In the embodiments illustrated by those figures, however, the rotation of the rings relative to the back cover appears to be achieved primarily by "rotatably disposing" the spine of the rings fixture inside a "conduit casing" that is attached to the cover. (Id. col. 4:40–44, 55:13–16, 57:46–48.) The spine, and thus the rings, rotate inside the conduit casing. The "hinge" and "hinge-like portion" thus do not serve the same function in these embodiments as the elastic pivot does in Claim 20 of the '140 Patent.

uses both the term "elastic pivot" and the term "hinge joint." Different terms in a patent claim are presumed to have different meanings. Chicago Bd. Options Exch., Inc. v. Int'l Sec. Exch., LLC, 677 F.3d 1361, 1369 (Fed. Cir. 2012). Further, Claim 20's use of the disjunctive "or" indicates that Chizmar understood the two terms to refer to two different structures. See SkinMedica, Inc. v. Histogen Inc., 727 F.3d 1187, 1200 (Fed. Cir. 2013) ("The disjunctive 'or' plainly designates that a series describes alternatives."). While the use of two terms as alternatives in a claim can sometimes amount to an implicit redefinition of the terms, under Federal Circuit precedent, "the 'implied' redefinition must be so clear that it equates to an explicit one. In other words, a person of ordinary skill in the art would have to read the specification and conclude that the applicant has clearly disavowed claim scope or has acted as its own lexicographer." Thorner v. Sony Computer Entm't Am. LLC, 669 F.3d 1362, 1368 (Fed. Cir. 2012). Chizmar has offered no evidence that a person of ordinary skill in the art would read Claim 20 as defining "elastic pivot" to mean the same thing as "hinge joint."

Chizmar relies on a portion of the '140 Patent's prosecution history, in which he stated: "Applicant discerns an elastic pivot as a pivot integrally joined between two components like the hinge-joint of the elbow that is between the upper arm and forearm or like a fold between two portions of a sheet of paper." (Silbersher Decl. Ex. J. at 15.) That sentence, however, does not support the proposition that the '140 Patent's elastic pivot refers to the same thing as the hinge joint disclosed in the earlier '640 Patent, which, as noted, is similar to a fold in a sheet of paper. Rather, it merely indicates that the elastic pivot has some of the characteristics of a generic "hinge joint." As the elbow example shows, not all hinge joints are elastic, but in the very next sentence of his statement to the examiner, quoted earlier, Chizmar emphasized that the material's elasticity is critical to the functioning of the elastic pivot. As described by Chizmar,

elasticity is what differentiates the elastic pivot from a generic "hinge joint," and the '640 Patent's hinge joint is not disclosed to be elastic.

Chizmar overreads another portion of the prosecution history. He stated to the examiner that support for what is now Claim 20 could be found in Figures 25A and 25B of the '749 Patent (Silbersher Decl. Ex. L at 2), which are identical to Figures 25A and 25B in the '640 Patent. Subsequently, the examiner noted that he "[i]nspected new and amended claims for 112 issues." (Silbersher Decl. Ex. M.) Chizmar takes this as evidence that the examiner confirmed Claim 20's entitlement to the benefit of the earlier filing date, but this is a rather thin reed on which to base that conclusion. Patent examiners are not expected to make determinations about the written description requirement "[u]nless the filing date of the earlier nonprovisional application is actually needed" during the examination process—for instance, "in the case of an interference or" a rejection of a claim based on prior art. Manual of Patent Examining Procedure § 201.08 (8th ed. Rev. 8, July 2010). Chizmar does not argue that such a need arose during the prosecution of the '140 Patent. There is thus no reason to believe that the examiner's terse remark amounted to a finding about Claim 20's entitlement to a priority date. In the absence of an explicit finding, no presumption of entitlement attaches. PowerOasis, Inc. v. T-Mobile USA, Inc., 522 F.3d 1299, 1305 (Fed. Cir. 2008); see also Bone Care Int'l, LLC v. Pentech Pharm., Inc., 741 F. Supp. 2d 865, 873–74 (N.D. Ill. 2010) (rejecting the patentees' argument that "the examiner implicitly 'accepted' their assertion regarding the priority date" by issuing the patent, in the absence of any explicit determination of priority in the patent's file history).

Finally, Chizmar points to the written description for Figure 19A of the '140 Patent, which states that the "cantilever bending action and elastic hinge action is also imitated by conduit casing 1014 in FIGS. 17G–I." ('140 Patent, col. 30:37–39.) Those figures are

identical to Figures 54G–54K in the '640 Patent; thus, as Chizmar puts it, "the '140 Patent expressly teaches that the elastic pivot's cantilever bending was taught in the '640 Patent." (Opp'n 8.) But the relevant inquiry is not what the later patent teaches about what was taught in the earlier patent. "Rather, the issue is whether a person skilled in the art would understand from the earlier application alone, without consulting the new matter in the ['140] [P]atent, that the inventor had possession of the claimed" subject matter. Videotek, 545 F.3d at 1333–34 (rejecting a similar argument based on "a passage in the [later] patent that compare[d] the operation of some circuit elements in [a new figure] to" a figure in an earlier patent).

Under the Videotek burden-shifting framework described earlier, the defendants met their initial burden of production by identifying prior art—the Flex Binders—which, the parties agree, would invalidate Claim 20 if it cannot claim the benefit of the '640 Patent's earlier filing date. It was then incumbent upon Chizmar to produce "evidence and argument" that creates a genuine issue of material fact with respect to whether the disclosures of the '640 Patent satisfy the written description requirement. This Chizmar has failed to do. Accordingly, Claim 20 of the '140 Patent is invalid as anticipated by the Flex Binders.

II. Infringement of Claim 17 of the '640 Patent

The defendants seek summary judgment on Chizmar's claim that the Flex Binders infringe Claim 17 of the '640 Patent. That claim reads:

> A binder for releasably binding a plurality of loose-leaves comprising:
> at least one ring that is openable and closable;
> an orthogonal base;
> a closure to secure ring closed;
> said ring has an oblong perimeter;
> said ring has a minor diameter defining an upright ring position when said minor diameter is substantially vertical;

said ring has roughly-vertical column-like thick portions when situated in said upright ring position;
said ring has a roughly-horizontal bow-like thin upper portion when situated in said upright ring position;
said ring has a roughly-horizontal extendable lower portion when situated in said upright ring position;
each of said column-like thick portions are on average thicker than said bow-like thin upper portion;
said orthogonal base perpendicularly intersects said lower portion of said ring;
said ring is reversibly compressible relative to a moderate compressive force roughly exerted in the direction of said minor diameter such that said column-like thick portions resist permanent buckling while said bow-like thin upper portion and said extendable lower portion more readily flatten and widen outward to provide most of desired reversible vertical compressibility and spring back to resume relaxed expanded form of said ring upon removal of said moderate compressive force.

('640 Patent col. 64:40–67.)

Patent infringement analysis is a two-step process. First, the Court must determine the scope and meaning of the asserted claim as a matter of law. Freedman Seating Co. v. American Seating Co., 420 F.3d 1350, 1356–57 (Fed. Cir. 2005); see Markman v. Westview Instruments, Inc., 517 U.S. 370, 384 (1996). Second, the finder of fact must compare the properly construed claim to the allegedly infringing product or process. Id.

A. Literal Infringement

To establish literal infringement of a patent, the patentee must show that every limitation recited in the asserted claim appears in the accused product. DeMarini Sports, Inc. v. Worth, Inc., 239 F.3d 1314, 1331 (Fed. Cir. 2001). If even one limitation is not present in the accused product, there is no literal infringement. See Laitram Corp. v. Rexnord, Inc., 939 F.2d 1533, 1535 (Fed. Cir. 1991) ("the failure to meet a single limitation is sufficient to negate infringement of the claim").

Claim 17 describes a binder with "at least one" oblong ring. In an upright position, the ring's minor diameter is "substantially vertical." In that position, the ring has "roughly-vertical column-like thick portions," "a roughly-horizontal bow-like thin upper portion," and "a roughly-horizontal extendable lower portion." The "column-like thick portions are on average thicker than [the] bow-like thin upper portion." The ring is "reversibly compressible": when pressure is "exerted in the direction of said minor diameter" (i.e., vertically, in the upright position), the thick portions "resist permanent buckling" while the horizontal upper and lower portions "more readily flatten and widen outward." Upon removal of the pressure, the ring "spring[s] back" to its original "expanded form."

The defendants argue that Claim 17 requires at least two "column-like thick portions" on opposite sides of the ring, separated by the "bow-like thin upper portion." Chizmar, on the other hand, argues that the "column-like thick portions" can be on the same side of the ring and do not need to be separated by the "bow-like thin upper portion."

The Court agrees with the defendants. While the bow-like thin upper portion is not expressly defined as separating the column-like thick portions, "proper claim construction demands interpretation of the entire claim in context, not a single element in isolation." Pause Tech., LLC v. TiVo, Inc., 419 F.3d 1326, 1331 (Fed. Cir. 2005) (quoting Hockerson-Halberstadt, Inc. v. Converse Inc., 183 F.3d 1369, 1374 (Fed. Cir. 1999) (alterations omitted)). Specifically, when there is a claim clause describing how the elements of the claim are expected to function, a court must take it into account when construing the elements themselves. See id. (rejecting the plaintiff's construction of the element "circular storage buffer" because it conflicted with a later clause of the claim detailing how the buffer stored data in memory). Here, the last clause of Claim 17 describes how the rings are expected to respond to vertical pressure: the thick vertical

portions "resist permanent buckling" and the horizontal bow-like portion "flatten[s] and widen[s] outward" to provide "vertical compressibility." This describes what one would expect of a ring in which the bow-like upper portion is supported by a column-like thick portion on either side. If the bow-like portion were supported by a column-like thick portion on only one side, it is unclear why the flattening and widening would happen; instead, the unsupported side of the bow-like portion would be expected to bend downward.[6] Chizmar's construction is thus in conflict with the last clause of Claim 17.

The defendants' position gains further support from the '640 Patent's specification and figures. The only column-like vertical thick portions expressly identified in the specification (1446Q and 1446P in Figure 53B, 1646Q and 1646P in Figure 55B, and 1746Q and 1746P in Figure 56B) are depicted on either side of expressly identified bow-like horizontal thin portions (elements 1446R, 1446S, 1646R, 1746R, and 1746S in those figures). ('640 Patent col. 54:36–47, col. 58:45–51, col. 59:6–12.) The rings in Figures 54, 57, 58, and 59 are also described as having column-like vertical thick portions and bow-like horizontal thin portions ('640 Patent col. 58:21–24, col. 59:25–27, col. 59:48–50, col. 59:66–60:1), and although these are not expressly identified in the figures, horizontal thin portions are shown supported on either side by thicker vertical portions.

Figures 57 and 59, on which Chizmar relies, are not to the contrary. Chizmar contends that these depict rings with "roughly-vertical 'column-like' thick portions that are not on opposite sides of the ring and are not separated by a thin upper portion." (Opp'n 14.) This is not a fair characterization. In both figures, the ring's upper bow-like portion is supported on

[6] Chizmar claims that the embodiments in Figures 53 and 54 teach that vertical portions on one side of a ring can "act like a ring-crush resistor for the other side" (Opp'n 14), but fails to explain how that is the case. As noted below, both of those figures show thick vertical ring portions on opposite sides of the ring.

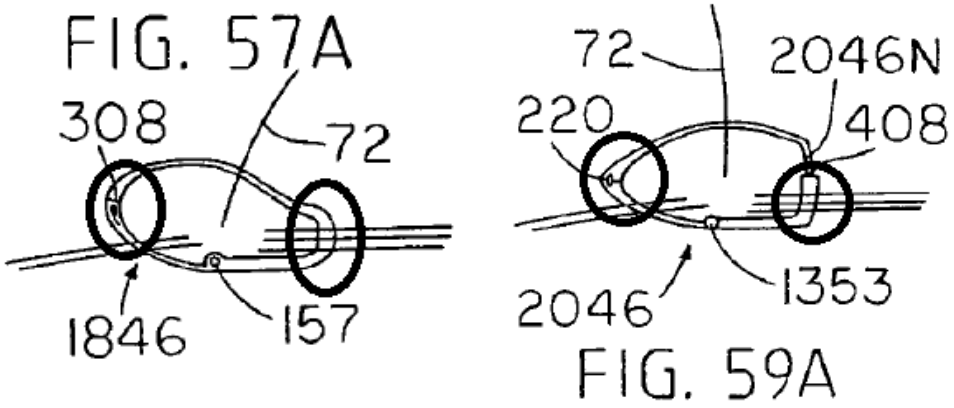

Illustration 1: Figures 57A and 59A of the '640 Patent, with the roughly vertical column-like thick portions circled.

either side by a thicker portion. Figures 57A and 59A are reproduced in Illustration 1, with the thick portions circled. Chizmar argues that because the ring in Figure 59 is described as "triangular," it is impossible for separate column-like portions to exist on opposite sides of the ring. This might be true if the ring were a true triangle, but the specification in fact describes the ring as "roughly triangular" ('640 Patent col. 59:61), and the ring in the figure is a conspicuously rounded triangle. Two rounded (or "bow-like") segments thicken on their way to meeting at strip hinge 220. Although that hinge is one of the points of the triangle, the meeting of the two segments, as shown, can fairly be described as a "roughly vertical column-like thick portion."

Chizmar's argument fails for the additional reason that he does not identify more than one roughly vertical column-like thick portion for each of the rings in Figures 57 and 59. Claim 17, however, expressly requires "roughly-vertical column-like thick portions," in the plural. Chizmar appears to argue that the thick portions adjoin each other, but does not specify, for either ring, where the first portion ends and where the second begins, or why they should be considered separate portions.

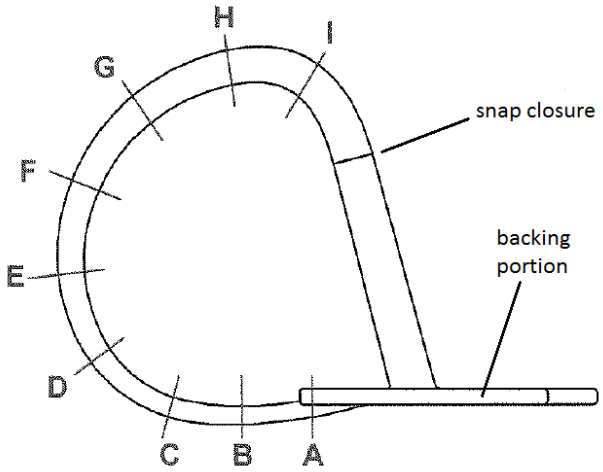

Illustration 2: "Current extra large" ring design. (Adapted from Busam Decl. Ex. F at 00000574.)

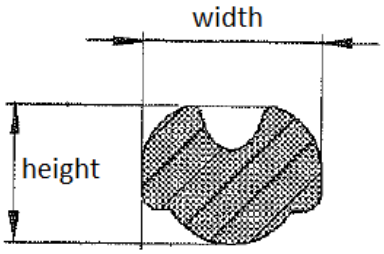

Illustration 3: sample cross-section diagram, showing "height" and "width" dimensions. (Adapted from Busam Decl. Ex. E.)

The Court thus holds that Claim 17 requires that the ring's "roughly-vertical column-like thick portions" be on either side of the "roughly-horizontal bow-like thin upper portion." This construction is mandated by the last clause of Claim 17, which describes how these portions respond to vertical pressure, and is supported by all of the relevant figures and their written descriptions.

Under this construction, the Flex Binders do not literally infringe Claim 17. In all five versions ever sold, the Flex Binders' rings decrease in thickness as one moves counterclockwise from the snap closure to the point where the ring attaches to the backing portion affixed to the back cover, as shown in Illustration 2. (Busam Decl. ¶¶ 15–16.) The defendants have submitted evidence showing that this is the case whether the measure of thickness is the cross-sectional area of the ring or the "height" of the cross-section, that is, what appears as the ring's thickness in the two-dimensional representation in Illustration 2. (Busam Decl. Exs. A–E.) Consequently, none of the Flex Binder rings have "roughly-vertical column-like thick portions" on either side of a "roughly-horizontal bow-like thin upper portion."

Chizmar does not dispute this with respect to four of the five types of Flex Binder rings. For the "current extra-large" ring design, however, the "width" of the cross-section—that is, the dimension parallel to the edge of the binder along which the rings are affixed, which is not visible in the two-dimensional representation in Illustration 2—does not decrease continuously from the closure to the backing portion. Instead, the width begins at 0.207 inches at the closure, but then drops to 0.194 inches at cross-section I and then increases from there to 0.2 inches at cross-section A. (Busam Decl. Ex. E at 2–3.) From this, Chizmar concludes that the "current extra-large" ring does in fact have two "roughly-vertical column-like thick portions" on either side of the ring: one near the closure, and another near cross-section E, where the "width" measurement is 0.196 inches. (Id. at 2.) Chizmar argues that, because this is greater than the "width" measurement near cross-section H—0.194 inches (id.)—the roughly vertical portions are "on average thicker than" the upper roughly horizontal portion.

The Court does not agree with Chizmar. By both other possible measures of thickness, the cross-sectional area and the "height" measurement, the ring is significantly thicker at cross-section H than at cross-section E.[7] By contrast, the difference in the "width" measurements at cross-sections E and H is negligible: at cross-section E it is a mere 1% greater than at cross-section H. No reasonable juror could conclude on the basis of these measurements that the "current extra-large" ring is thicker at cross-section E than at cross-section H, unless the '640 Patent expressly defined "thickness" in terms of the "width" measurement. But the patent provides no definition of "thickness." Further, in most of the figures illustrating embodiments with "thick" and "thin" ring portions, the binder rings are shown from the side, with the "width"

[7] At cross-section E, the cross-sectional area is 0.02 square inches, and the "height" measurement is 0.14 inches. At cross-section H, the cross-sectional area is 0.023 square inches (15% greater), and the "height" measurement is 0.169 inches (20.7% greater). (Busam Decl. Ex. E at 2.)

dimension not visible. In the figures where the "width" dimension is shown (Figures 53A, 53B, and 54K[8]), it does not appear to vary across different portions of the same ring. In short, nothing in the '640 Patent draws any attention to the "width" dimension, let alone suggests that it should define a ring's thickness. Thus, the "current extra-large" Flex Binder rings do not literally infringe Claim 17 as construed by the Court.

B. Infringement under the Doctrine of Equivalents

A product that does not literally infringe a claim may nonetheless be found to infringe under the doctrine of equivalents, if the patentee shows that "there is 'equivalence' between the elements of the accused product . . . and the claimed elements of the patented invention." Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 21 (1997). Equivalence is determined on an element-by-element basis, not by examining the invention as a whole. Id. at 29. "An element in the accused product is equivalent to a claim limitation if the differences between the two are 'insubstantial' to one of ordinary skill in the art." Wavetronix LLC v. EIS Elec. Integrated Sys., 573 F.3d 1343, 1360 (Fed. Cir. 2009) (quoting Eagle Comtronics, Inc. v. Arrow Commc'n Labs., Inc., 305 F.3d 1303, 1315 (Fed. Cir. 2002)). "One way of proving infringement under the doctrine of equivalents is to show, for each claim limitation, that the accused product 'performs substantially the same function in substantially the same way with substantially the same result as each claim limitation of the patented product.'" Brilliant Instruments, Inc. v. GuideTech, LLC, 707 F.3d 1342, 1347 (Fed. Cir. 2013) (quoting Crown Packaging Tech., Inc. v. Rexam Beverage Can Co., 559 F.3d 1308, 1312 (Fed. Cir. 2009)). This is known as the "function-way-result test." Id.

[8] Figure 54K is mislabeled "51K" in the patent. (Chizmar Dep. 156:6–19.)

To defeat a motion for summary judgment on the doctrine of equivalents, the patentee must "provide particularized testimony and linking argument on a limitation-by-limitation basis that create[s] a genuine issue of material fact as to equivalents." AquaTex Indus., Inc. v. Techniche Solutions, 479 F.3d 1320, 1328–29 (Fed. Cir. 2007). This particularized testimony must come from "a person of ordinary skill in the art, typically a qualified expert." Id. at 1329. "Generalized testimony as to the overall similarity between the claims and the accused infringer's product or process will not suffice." Id. at 1328 (quoting Texas Instruments, Inc. v. Cypress Semiconductor Corp., 90 F.3d 1558, 1567 (Fed. Cir. 1996)).

Rather than providing his own expert, Chizmar relies on the deposition testimony of Edward Busam, who was ACCO's director of product innovation at the time the Flex Binders were developed. (Busam Dep. 19:16–25.) He first contends that the Flex Binder rings have two less flexible, or more rigid, portions on either side, which are equivalent to the "roughly-vertical column-like thick portions" element of Claim 17 because their rigidity allows them to resist buckling. The Flex Binders are designed with a "core-out," or groove, that runs along the inside of the rings. Busam testified that the core-out is deepest near cross-sections G and H of the ring, and becomes shallower as one moves away from them along the ring in either direction. (Id. 160:23–161:11.) He also testified that making the core-out deeper "could" make the ring more "bendable" at that point. (Id. 155:5–8.) Chizmar concludes from this that, because the core-out is slightly shallower around cross-sections E and F than around cross-sections G and H, the portion of the ring near E and F is more rigid and constitutes a second rigid roughly-vertical portion of the ring. But Chizmar disregards the very next part of Busam's testimony, in which Busam explains that the ring's cross-sectional area also affects its flexibility, and that portions with a smaller cross-sectional area do not need as deep a core-out to achieve flexibility. (Id.

155:11–17.) Chizmar has not shown that the effect of the shallower core-out around E and F offsets the effect of the smaller cross-sectional area at those points.

Next, Chizmar argues that the portion of the Flex Binder rings that all parties agree is roughly vertical and relatively rigid, on the right side of the ring in Illustration 2, is by itself equivalent to the at least two "roughly-vertical column-like thick portions" claimed in Claim 17. He once again relies on portions of Busam's deposition, which he claims bear on the function-way-result test. Specifically, he interprets Busam as stating that the relatively rigid portion of the ring performs the same function (allowing the ring to be reversibly compressible in response to vertical pressure), in the same way (by resisting permanent buckling while more flexible portions "flatten and widen outward"), with the same result (reversible vertical compressibility), as the "roughly-vertical column-like thick portions." (Opp'n 19–20.)

That Chizmar defines the "function" and the "result" of the rigid portion in almost identical terms is a first indication that his attempt to map Busam's testimony onto the function-way-result test is strained. But more importantly, Busam describes the function of the rigid portion differently from what Chizmar's selective quotations suggest. Busam testified that, in the area near the snap closure, the ring was designed to have "enough stiffness and structure . . . so that when a consumer pushes on this area to snap the ring closed . . . this area wouldn't break or deflect or otherwise interfere with the snapping function." (Busam Dep. 159:23–160:3.) According to this testimony, the "function" of the rigid portion is to ensure that the snap closure works properly, not to ensure reversible compressibility or to resist vertical pressure in the abstract. There is nothing in the '640 Patent to suggest that the "roughly-vertical column-like thick portions" similarly serve to facilitate ring closure. Further, the "buckling" referred to in Busam's testimony is not caused by the application of vertical pressure. Instead, it refers to an

undesirable "kink" or "crease" in the shape of the ring produced in some prototypes by a suboptimal core-out depth or cross-section design, which affected the flexibility of the ring.[9] (Id. 161:20–163:5.) And the rigid ring portion does not appear to have played in role in removing these kinks or creases; rather, they were removed by refining the design of the core-out and cross-section, and thus achieving the right level of flexibility along the length of the ring. (Id. 161:20–162:1 ("[W]e did a lot of experimentation on the transitional nature of the round cross-section, the rectangular cross-section and the depth and transitional nature of the groove . . . to try to achieve the pleasing shape when it's bent."); id. 164:8–10 ("we played with all the factors that I mentioned to influence the resulting bent shape")).

Busam's testimony does not support Chizmar's contention that the Flex Binder ring's more rigid portion satisfies the function-way-result test with respect to the "roughly-vertical column-like thick portions" element, or more broadly that the rigid portion is "equivalent" to that element. Chizmar has thus not met his burden of showing that a genuine issue of material fact exists on the question of infringement under the doctrine of equivalents.

CONCLUSION

Because Claim 20 of the '140 Patent is invalid as anticipated, and because the Flex Binders do not infringe Claim 17 of the '640 Patent, the defendants' motion for summary judgment is GRANTED in its entirety. The Court need not reach the issue of Claim 17's indefiniteness. The Clerk is directed to close the case.

[9] The word "buckle" was in fact supplied to Busam by Chizmar's counsel. (Busam Dep. 162:22–163:5 ("A. When you bend the ring around, we experienced cases where we would get a kink or an actual—what am I trying to say? Does the word kink make sense? Q. Does it buckle? Do you mean buckle? A. Buckle could apply. Instead of getting a resultant pleasing round shape we would get a kink or buckle or a crease at an undesirable place.").

SO ORDERED.

P. Kevin Castel
United States District Judge

Dated: New York, New York
May 8, 2015

Castel, K.

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

JAMES S. CHIZMAR,

Plaintiff,

v.

ACCO BRANDS CORPORATION, and STAPLES, INC.,

Defendants.

Case No. 1:14-cv-02181 (PKC)

JOINT STIPULATION OF DISMISSAL

WHEREAS, on March 28, 2014, plaintiff James S. Chizmar ("Chizmar") filed the Complaint in this action (Doc. 1) alleging patent infringement of U.S. Patent No. 8,277,140 ("the '140 Patent") and U.S. Patent No. 7,347,640 ("the '640 Patent") by defendants ACCO Brands Corp. ("ACCO") and Staples, Inc. ("Staples") (collectively, "Defendants");

WHEREAS, on June 17, 2014, Staples filed an Answer to the Complaint (Doc. 16), and through its Answer, denied having committed any act of infringement of the '140 Patent and the '640 Patent;

WHEREAS, on June 23, 2014, ACCO filed an Answer to the Complaint (Doc. 21), and through its Answer, denied having committed any act of infringement of the '140 Patent and the '620 Patent and further pleaded counterclaims for declaratory judgment of noninfringement and invalidity of the '140 Patent and the '640 Patent, respectively;

WHEREAS, on May 8, 2015, the Court issued an order granting Defendants' motion for summary judgment that the '140 Patent is invalid, and the '640 Patent is not infringed (Doc. 60);

WHEREAS, on May 12, 2015, the Court entered its Judgment in favor of the Defendants pursuant to its grant of summary judgment that the '140 Patent is invalid and the '640 Patent is not infringed (Doc. 63).

IT IS HEREBY STIPULATED AND AGREED, that ACCO's counterclaims for declaratory judgment against Chizmar are each dismissed without prejudice, subject to reinstatement in the event of reversal or remand of the Court's claim construction or summary judgment rulings on appeal. Nothing in this Stipulation should be construed as waiving or in any way affecting Defendants' ability to move the Court for recovery of their attorneys' fees and costs.

STIPULATED AND AGREED TO:

Dated: June 3, 2015

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Attorneys For Defendants
ACCO Brands Corp. and Staples Inc.

SO ORDERED this 4th day of June, 2015

SO ORDERED:

U.S.D.J.

US008277140B2

(12) **United States Patent**
Chizmar

(10) **Patent No.: US 8,277,140 B2**
(45) **Date of Patent: Oct. 2, 2012**

(54) **LOOSE-LEAF BINDER**

(76) Inventor: **James S. Chizmar**, New York, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 708 days.

(21) Appl. No.: **12/206,196**

(22) Filed: **Sep. 8, 2008**

(65) **Prior Publication Data**

US 2009/0003925 A1 Jan. 1, 2009

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/054,270, filed on Mar. 24, 2008, now abandoned, which is a continuation of application No. 10/796,634, filed on Mar. 8, 2004, now Pat. No. 7,347,640, which is a continuation-in-part of application No. 10/123,000, filed on Apr. 15, 2002, now Pat. No. 6,702,501, which is a continuation-in-part of application No. 09/698,838, filed on Oct. 27, 2000, now Pat. No. 6,371,678, which is a continuation-in-part of application No. 09/296,377, filed on Apr. 22, 1999, now Pat. No. 6,196,749.

(51) **Int. Cl.**

B42F 3/02	(2006.01)
B42F 13/02	(2006.01)
B42F 3/00	(2006.01)
B42F 13/00	(2006.01)
B42F 13/04	(2006.01)
B42F 13/16	(2006.01)
B42F 13/20	(2006.01)
B42F 13/12	(2006.01)

(52) **U.S. Cl.** **402/20**; 402/5; 402/19; 402/26; 402/29; 402/31; 402/35; 402/70; 402/73; 402/74; 402/75; 402/76; 402/77

(58) **Field of Classification Search** ..... 402/5, 19, 402/20, 26, 29, 31, 35, 70, 73, 74, 75, 76, 402/77, 80 R
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

659,860 A 10/1900 Schild
(Continued)

FOREIGN PATENT DOCUMENTS

BE 494777 7/1950
(Continued)

OTHER PUBLICATIONS

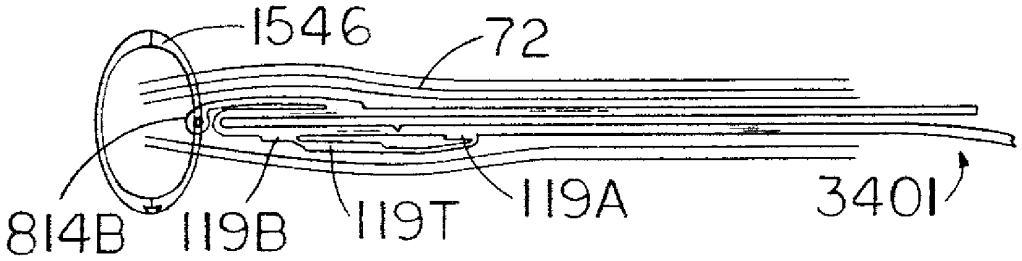
http://www.usringbinder.com/plastix.htm Aug. 26, 2003.
(Continued)

Primary Examiner — Dana Ross
Assistant Examiner — Justin V Lewis
(74) *Attorney, Agent, or Firm* — Locke Lord LLP

(57) **ABSTRACT**

A binder for releasably retaining loose-leaves. The binder has a front cover that lies flatly beneath its back cover when the binder is open 360 degrees. The rings of the binder can rotate around an edge of the flatly-folded cover to enable loose-leaves to lie flat above and below the cover. The binder also has a skeleton with a minimal cross-section spine which may be partially or completely embedded in a cover and rotates in relation to parallel front and back covers when the binder is open 360 degrees. The front cover, middle cover and back cover are connected in a way so that they do not interfere with the rotation of the rings. Mechanisms to open and close the rings of the skeleton to allow addition or removal of loose-leafs, and ring shapes to optimize or stabilize the capacity of the binder during operation are also disclosed.

23 Claims, 15 Drawing Sheets



U.S. PATENT DOCUMENTS

842,851	A		2/1907	Boden	
854,074	A		5/1907	Bryant	
857,377	A		6/1907	Baker	
901,549	A		10/1908	Nelson	
924,647	A		6/1909	Eddy	
974,831	A		11/1910	Scherzinger	
1,228,866	A		6/1917	Amoroso	
1,398,388	A		11/1921	Murphy	
1,710,493	A		4/1929	Van Valkenburgh	
1,827,592	A		10/1931	Lewis	
2,017,188	A	*	10/1935	Tannehill	402/35
2,051,738	A		8/1936	Ottinger	
2,185,004	A		12/1939	Trussell	
2,206,317	A		7/1940	Behn	
2,268,431	A		12/1941	Slonneger	
2,331,461	A		10/1943	Dawson	
2,715,906	A		8/1955	Lucchesi	
2,764,162	A		9/1956	Valla	
2,924,221	A		2/1960	Dudley-Smith	
3,190,293	A		6/1965	Schneider	
4,130,368	A		12/1978	Jacoby	
4,690,580	A	*	9/1987	Kissel	402/31
4,798,491	A		1/1989	Lässle	
4,815,882	A		3/1989	Ohminato	
4,848,948	A		7/1989	Pitts	
4,904,103	A		2/1990	Im	
4,919,557	A		4/1990	Podosek	
4,930,925	A		6/1990	Baldwin	
5,015,114	A		5/1991	Miller	
5,104,250	A	*	4/1992	Pacione	402/73
5,213,429	A		5/1993	Johnson	
5,333,962	A		8/1994	Johnson	
5,553,959	A		9/1996	Feldman	
5,611,633	A	*	3/1997	Whaley	402/73
5,642,954	A		7/1997	Hudspith	
5,697,646	A		12/1997	Venegas	
5,975,784	A		11/1999	Whaley	
6,168,337	B1		1/2001	Adams	
6,196,749	B1		3/2001	Chizmar	
6,213,668	B1		4/2001	Brown	
6,371,678	B1		4/2002	Chizmar	
6,431,779	B1		8/2002	Moor	
6,702,501	B2		3/2004	Chizmar	
6,935,497	B1		8/2005	Domotor	

FOREIGN PATENT DOCUMENTS

DE	111629	7/1900
FR	964994	8/1950
GB	2190331	11/1987

OTHER PUBLICATIONS

http://www.rickieworld.com.hk/products/D-3.htm Aug. 27, 2003 (entitled "Memo Mechanism Trigger Type-6-Ring (Plastic)").
http://www.gbcoffice.com/products/binding/proclicksupplies.asp Mar. 4, 2004 (entitled "GBC ProClick™ spines").
http://www.gbcoffice.com/products/binding/zipbindsupplies.asp Mar. 4, 2004 (entitled "GBC ZipBind™ spines").
GBC office products "proClick" product literature (2 sheets).
Supplemental European Search Report of related European Application No. EP 03 72 4072, mailed Mar. 30, 2006.
Supplemental European Search Report of related European Application No. EP 00 92 6070, mailed Aug. 17, 2006.

* cited by examiner

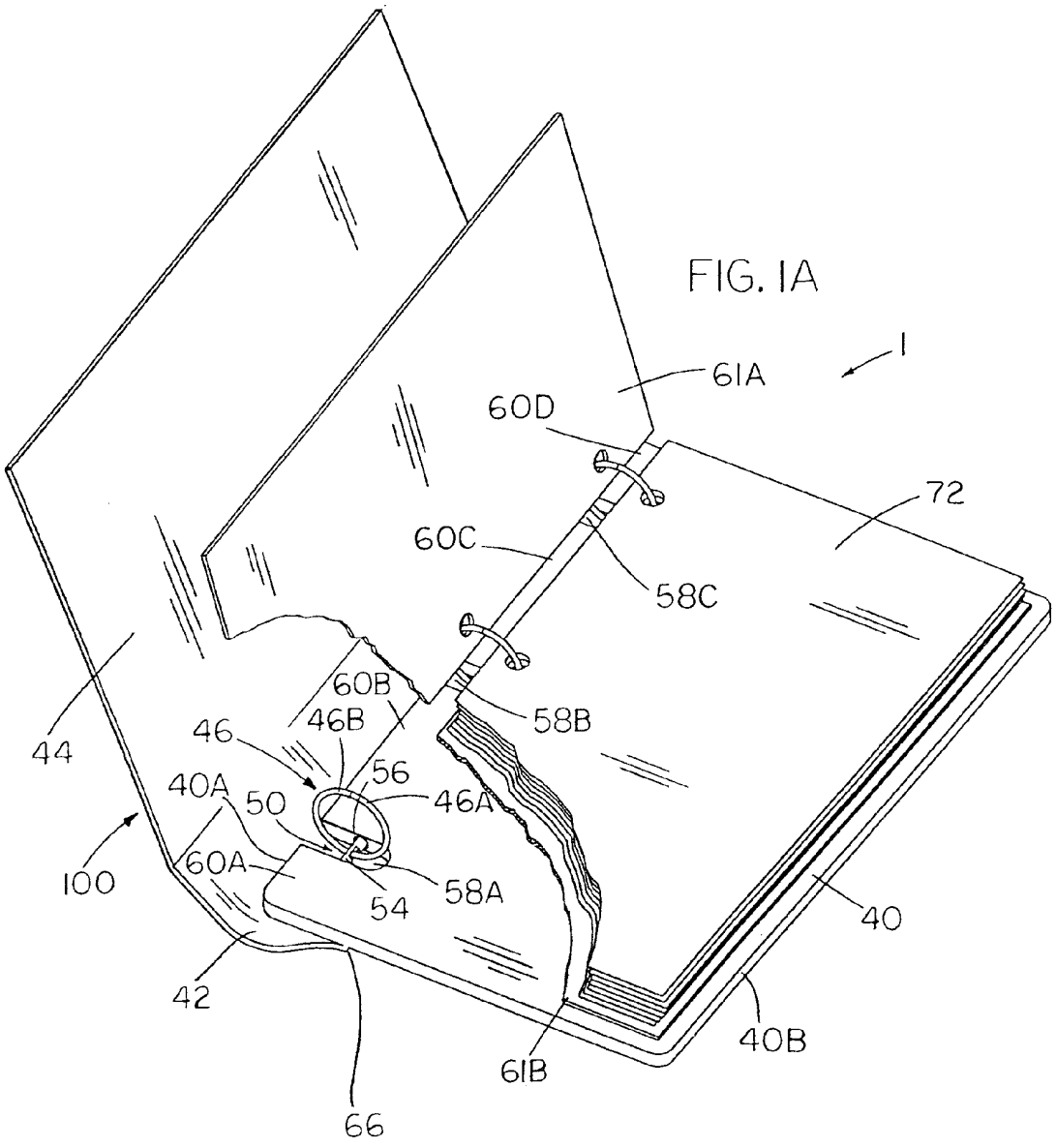


FIG. 1A
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60C
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60B
46B
58B
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60A
58A
54
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40B
61B
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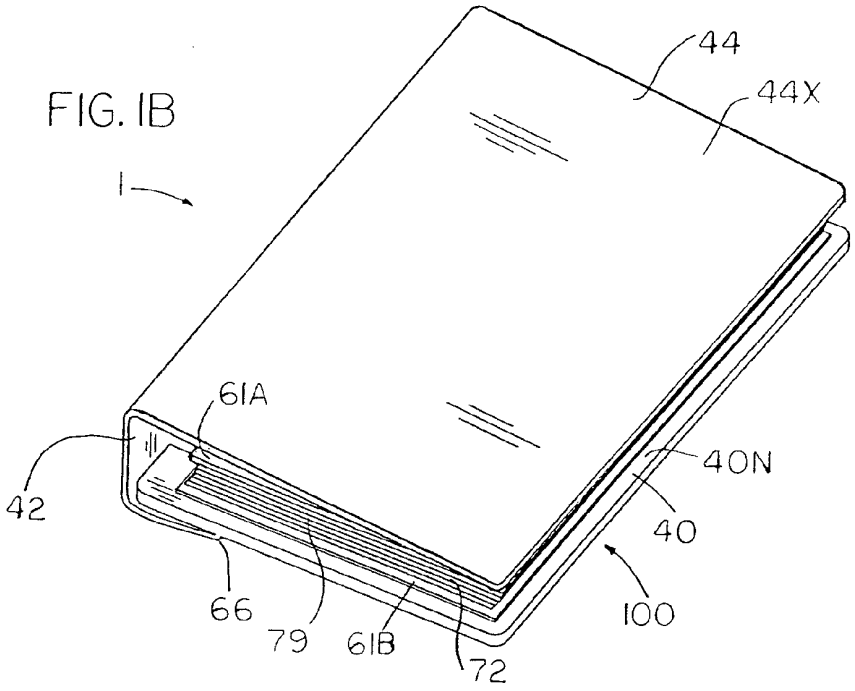
FIG. 1B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40N
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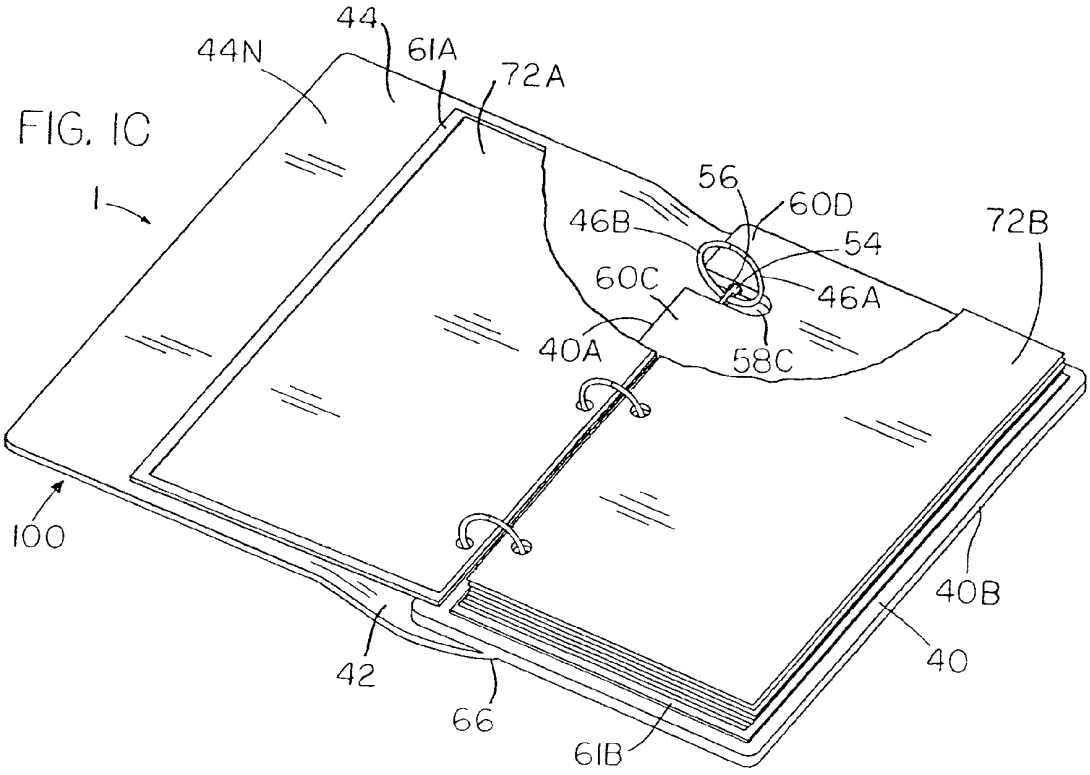
61B
72
100

FIG. 1C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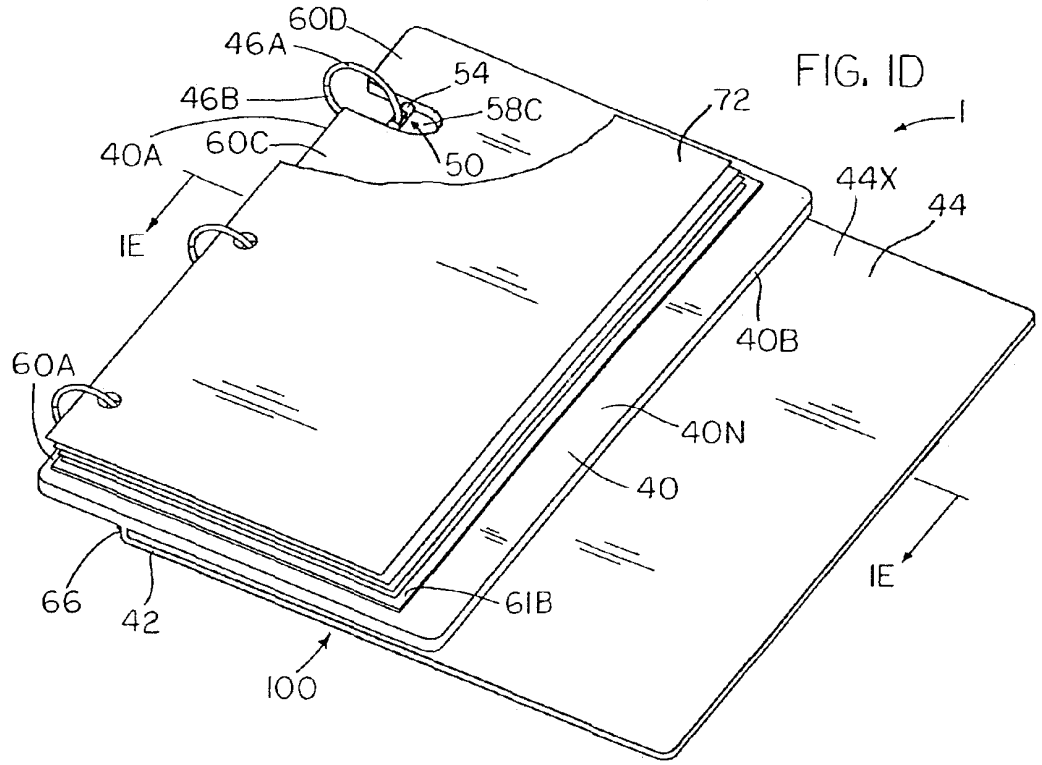
42
66
61B



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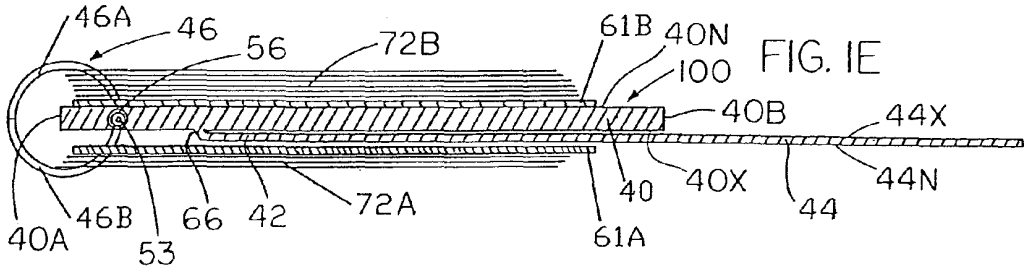


FIG. IE

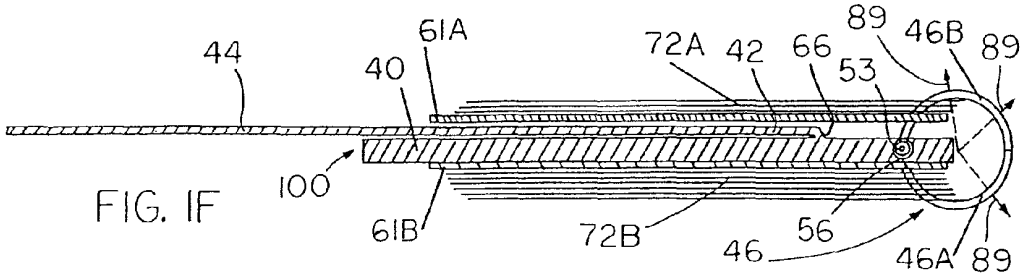


FIG. IF

FIG. 1G

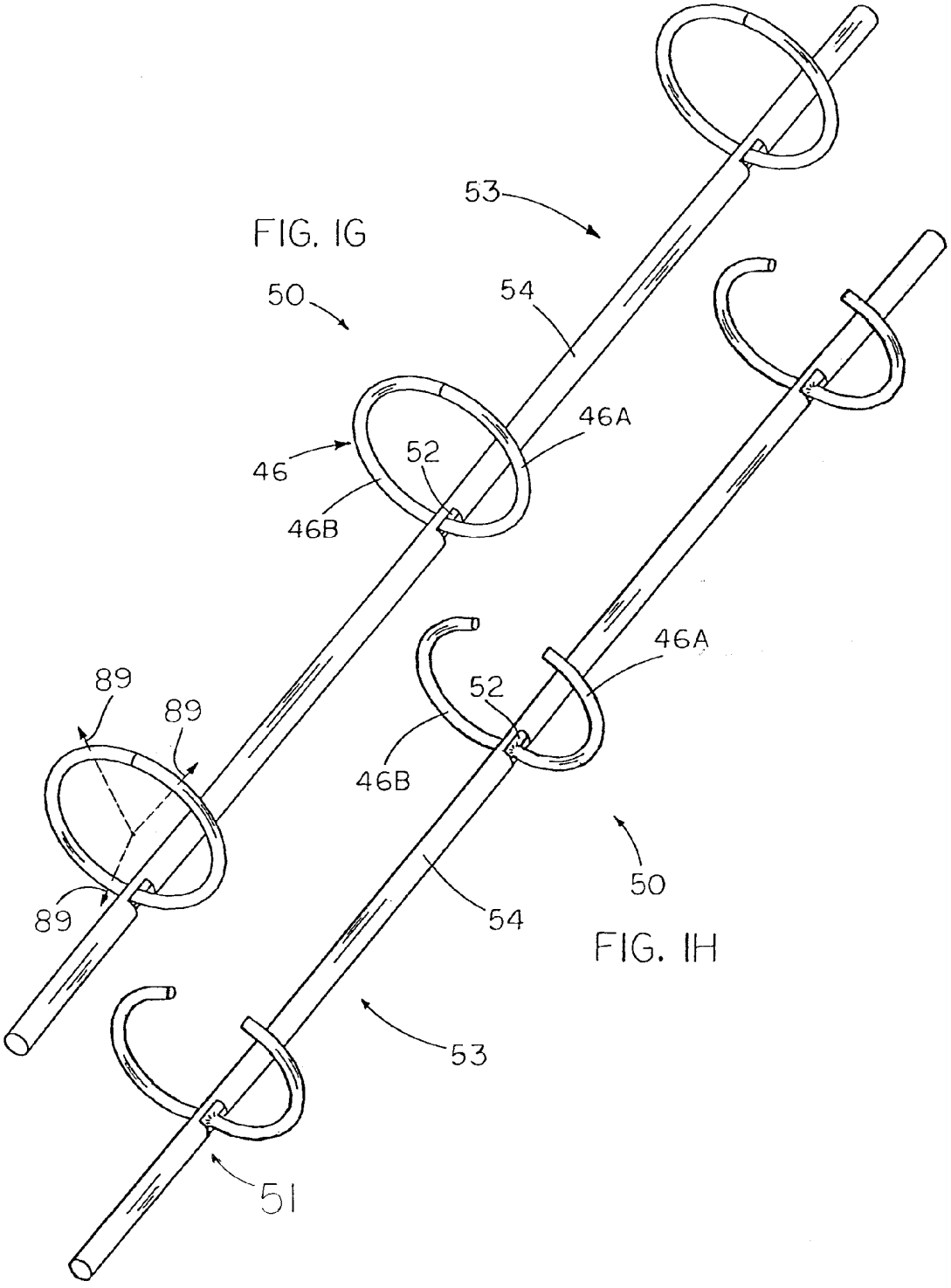
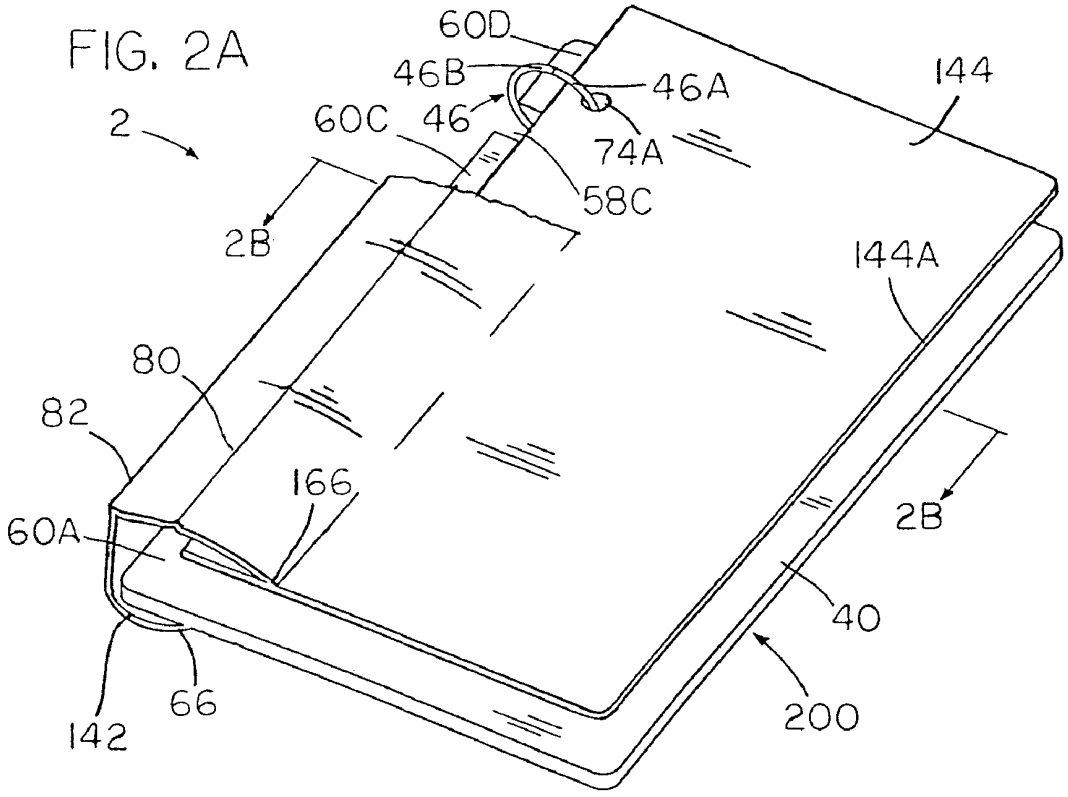


FIG. 1H

FIG. 2A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58C
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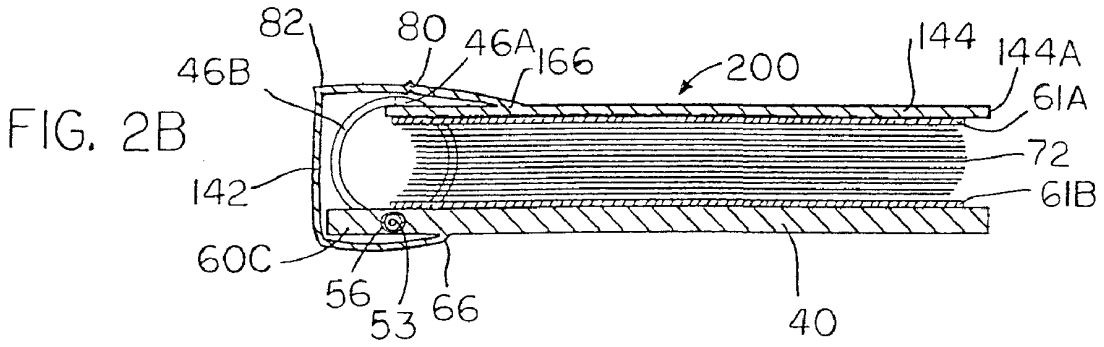
200

FIG. 2B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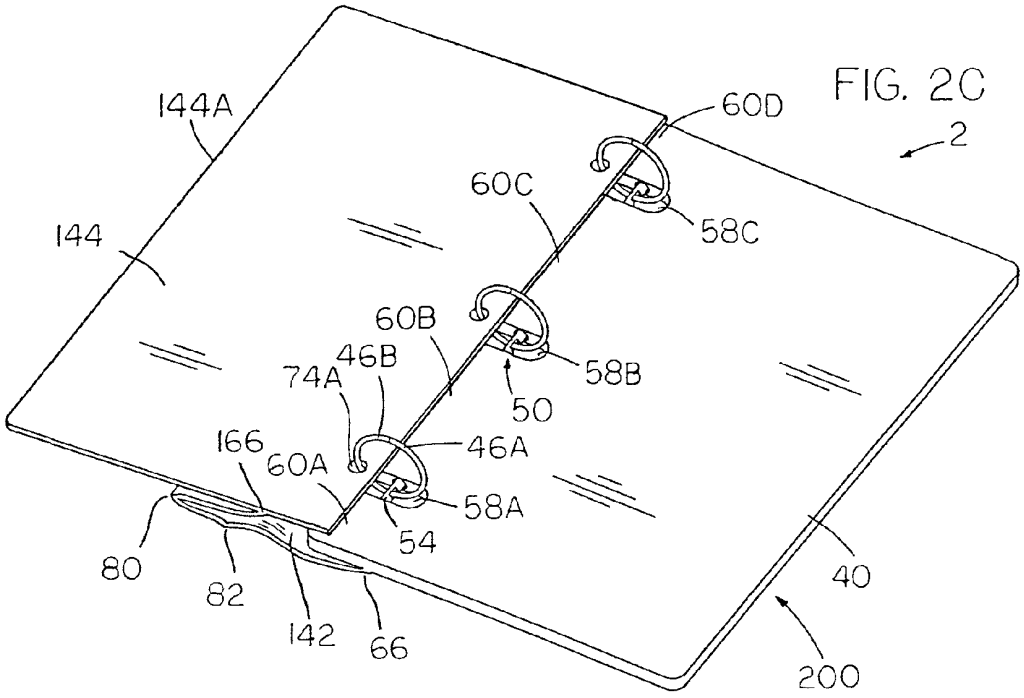


FIG. 2C

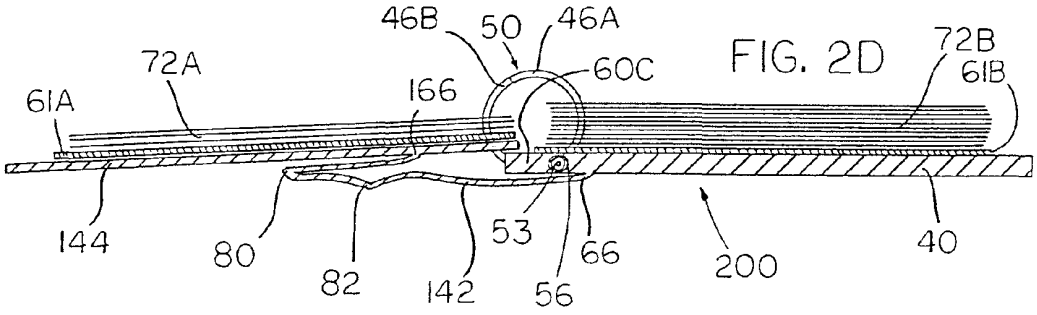


FIG. 2D

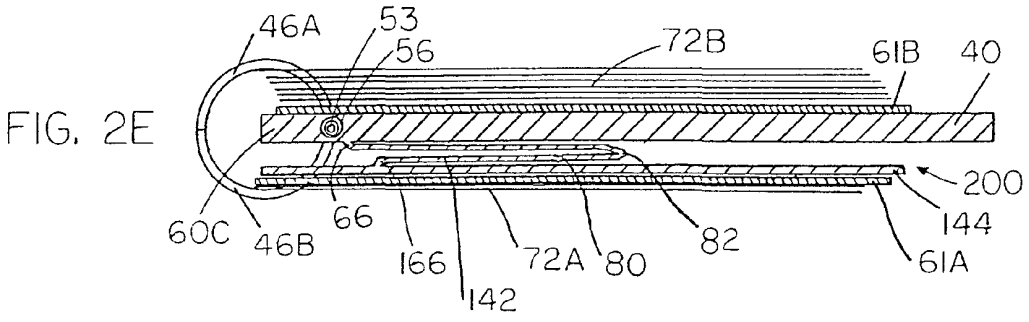


FIG. 2E

FIG. 3A

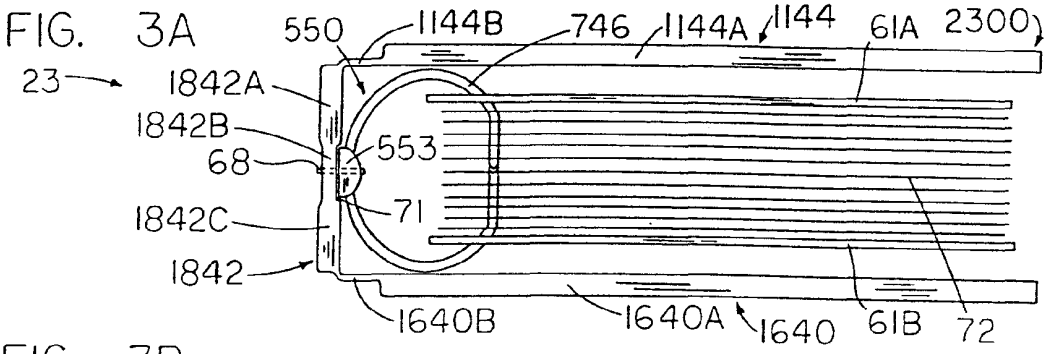


FIG. 3B

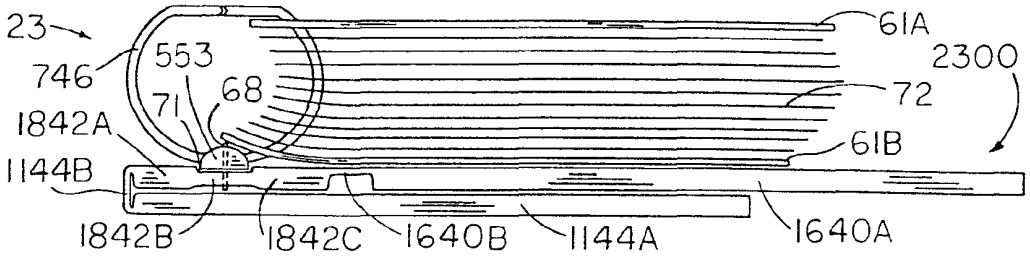


FIG. 3C

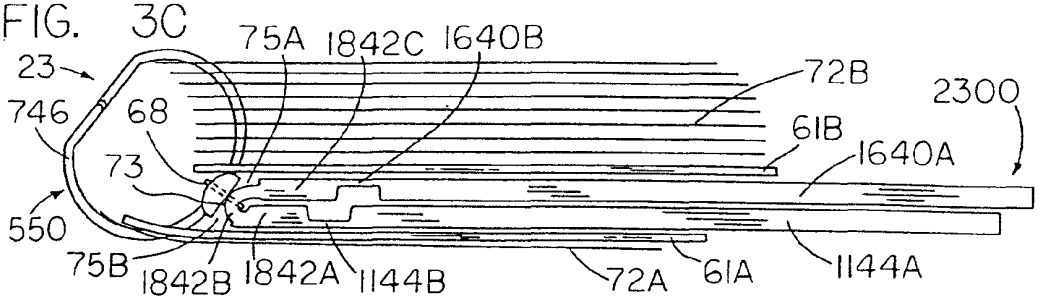


FIG. 3D

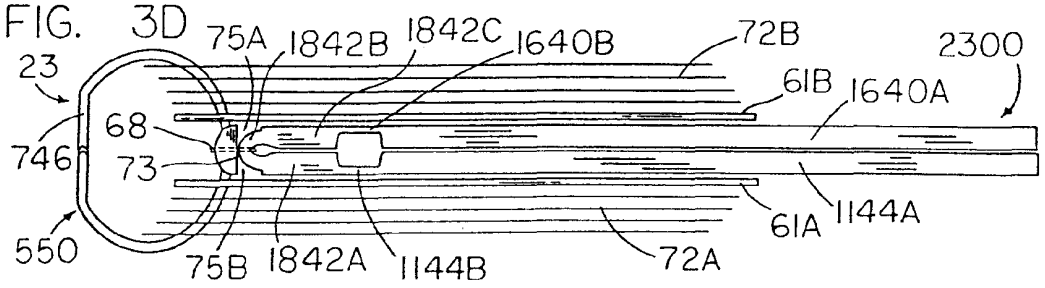


FIG. 3E

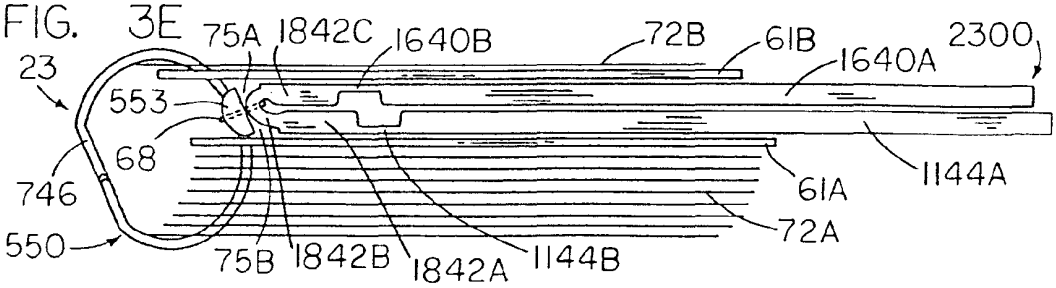


FIG. 4A

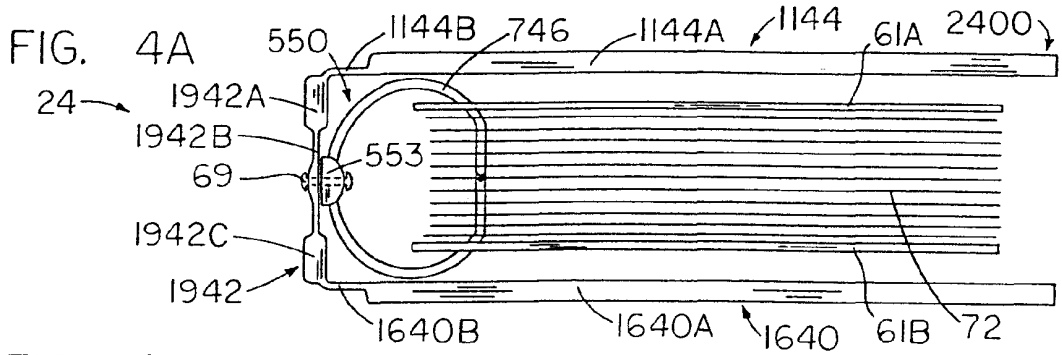


FIG. 4B

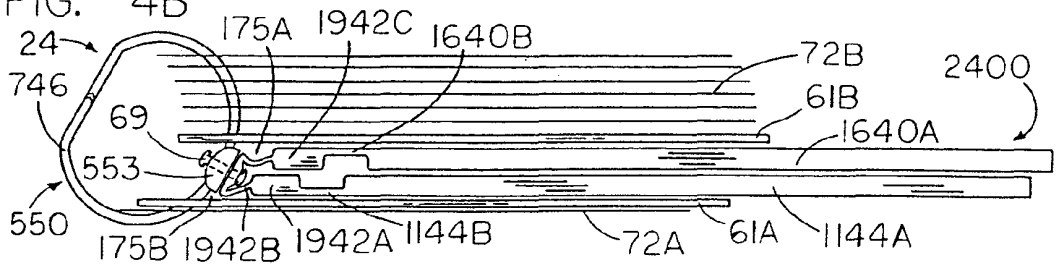


FIG. 4C

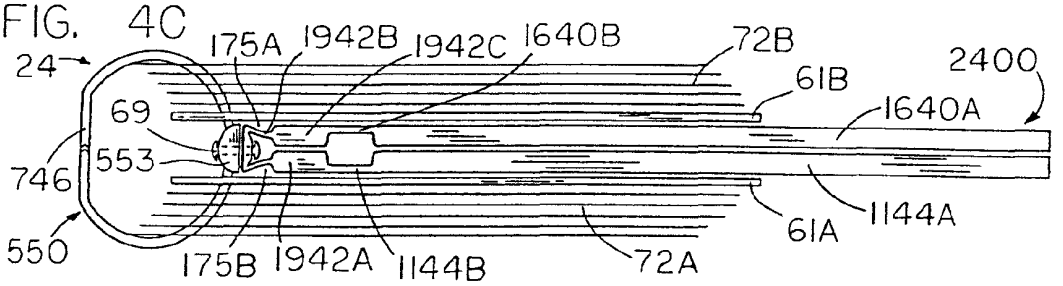


FIG. 5A

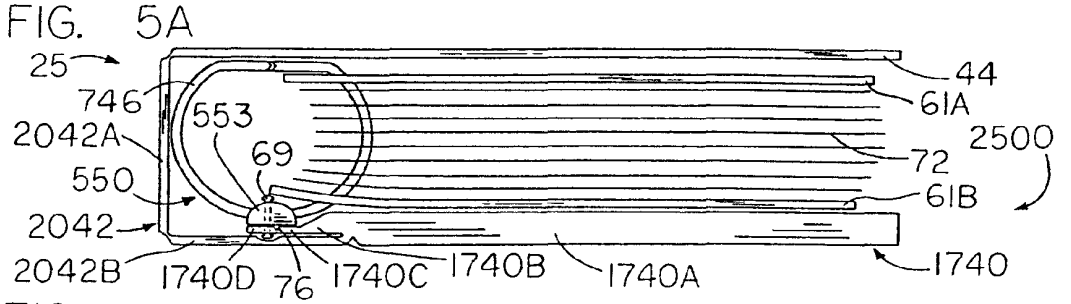


FIG. 5B

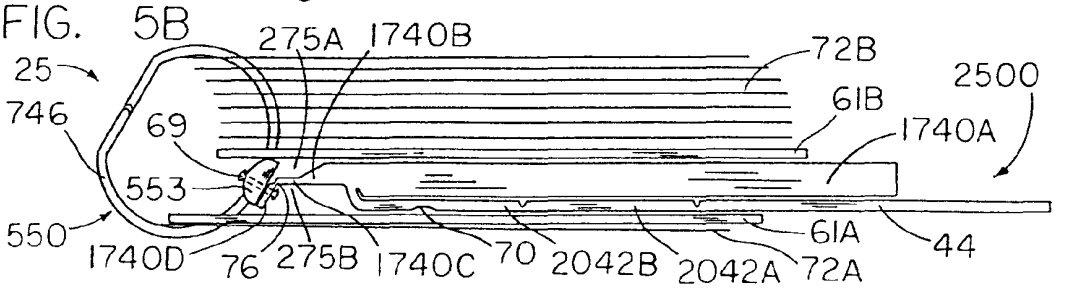


FIG. 6B

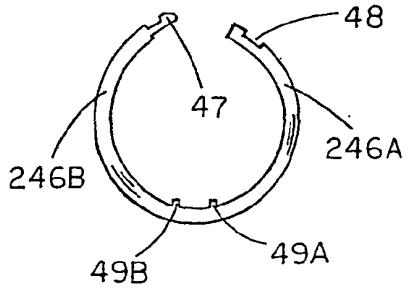


FIG. 6A

FIG. 6C

FIG. 7A

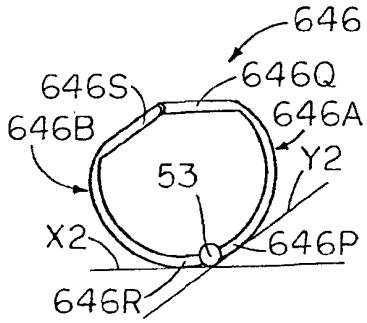


FIG. 8

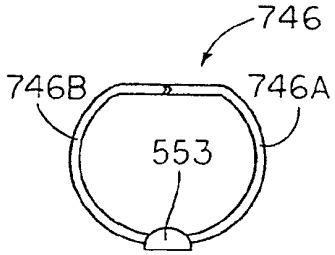


FIG. 9

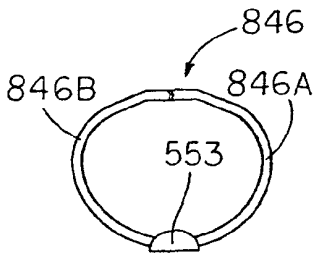


FIG. 10

FIG. 7B

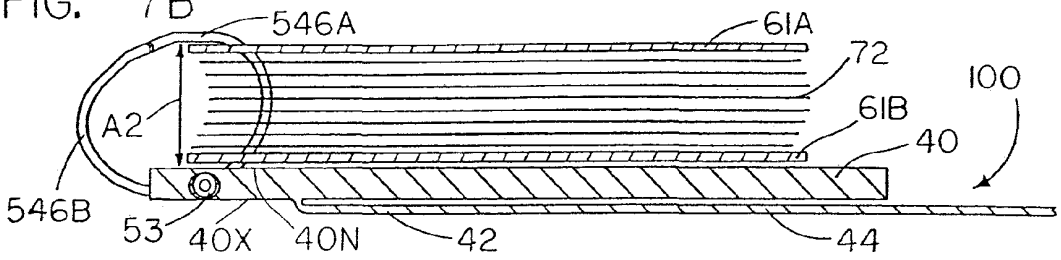


FIG. 7C

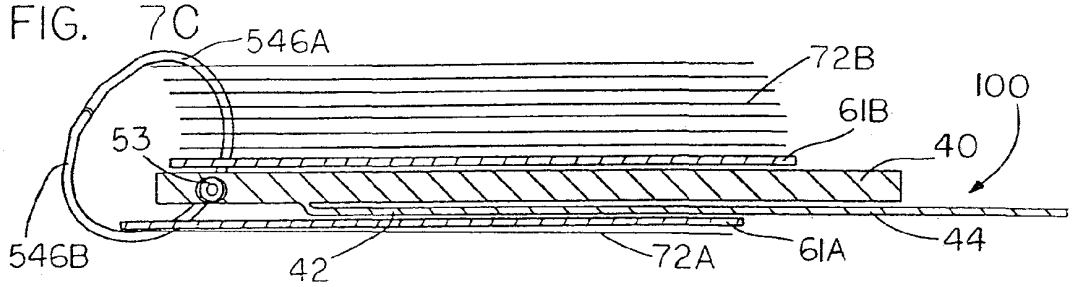


FIG. 7D

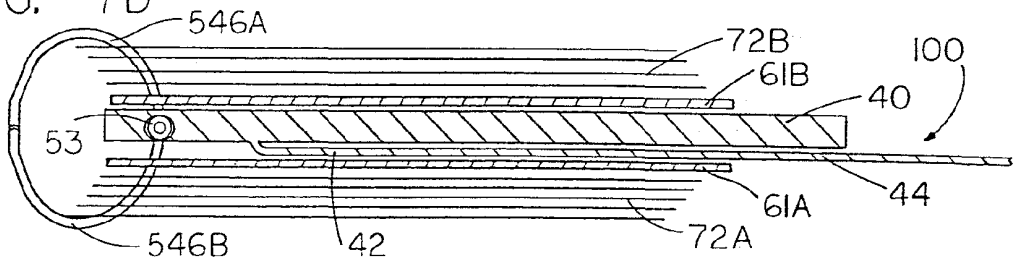


FIG. 7E

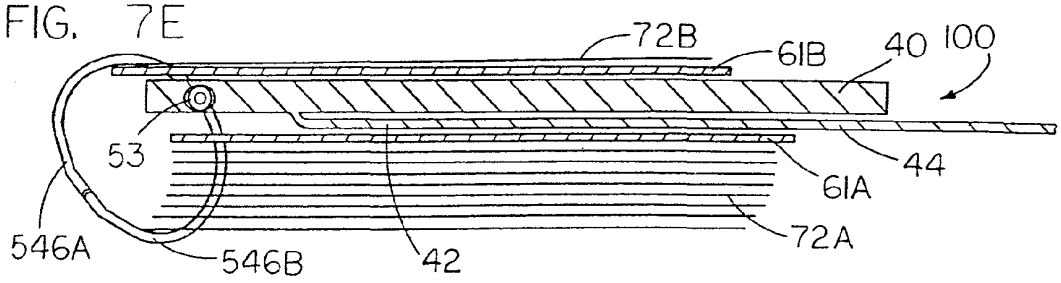


FIG. 7F

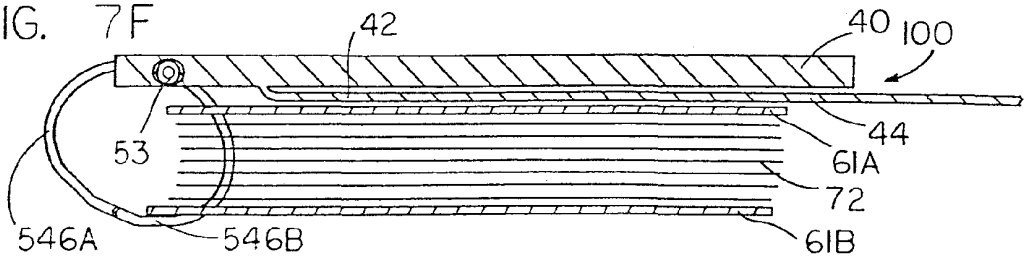


FIG. 11A

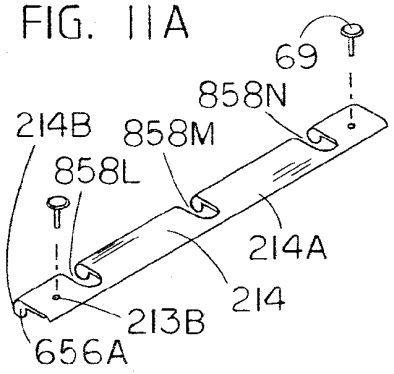


FIG. 11B

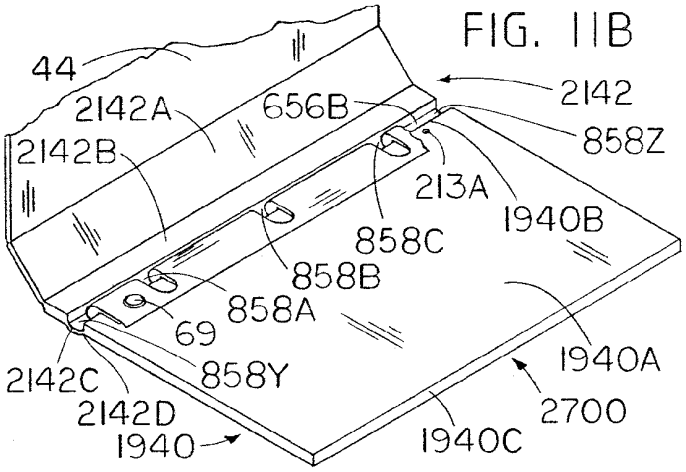
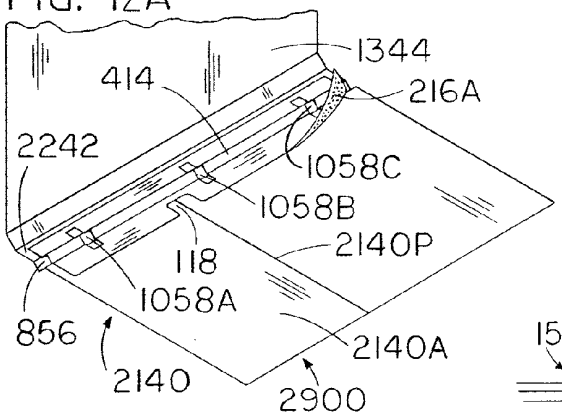


FIG. 12A



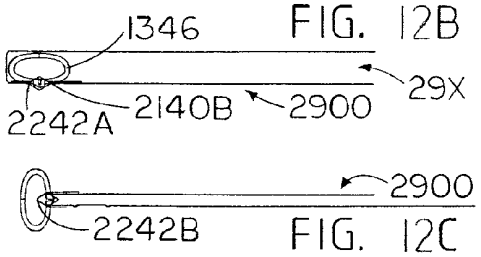


FIG. 12B

FIG. 12C

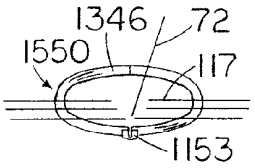


FIG. 12D

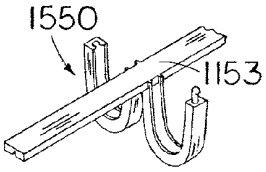


FIG. 12E

FIG. 13A

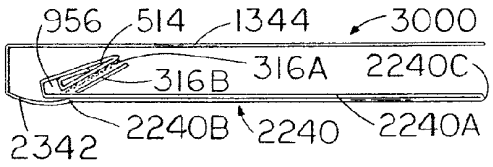
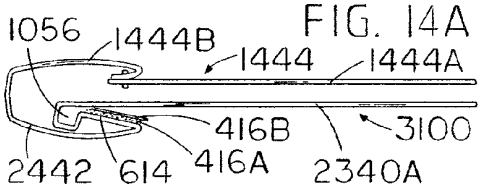


FIG. 14A



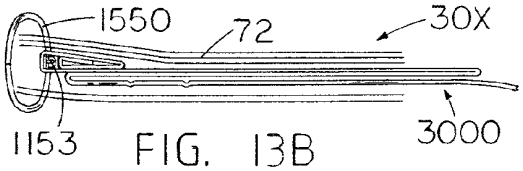


FIG. 13B

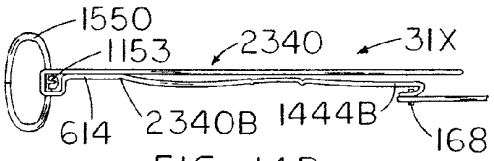


FIG. 14B

FIG. 15A

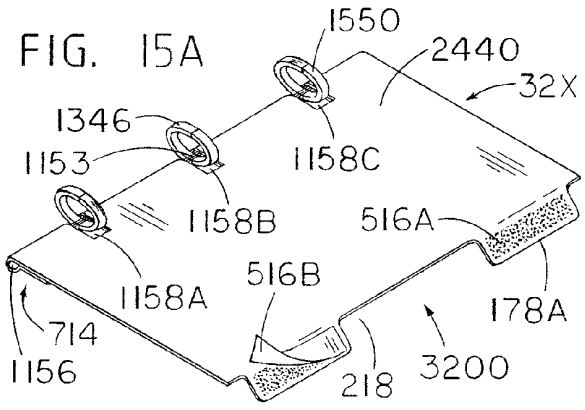
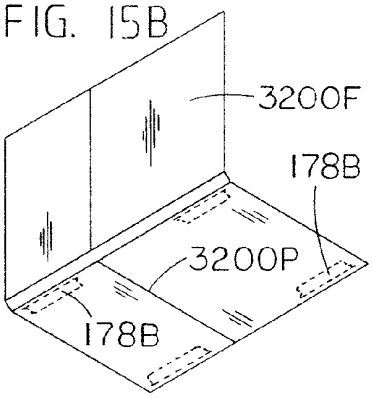


FIG. 15B



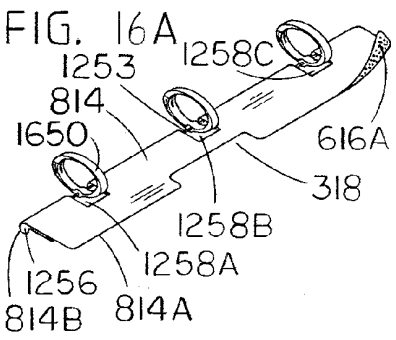


FIG. 16A

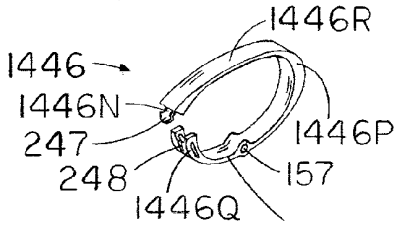


FIG. 16B

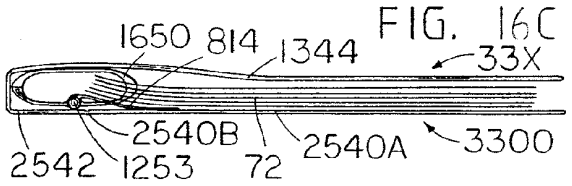


FIG. 16C

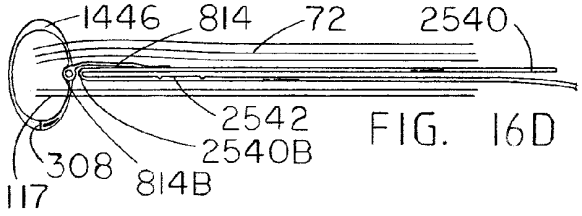


FIG. 16D

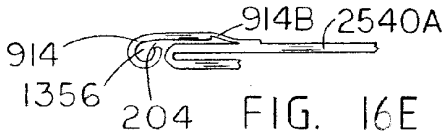


FIG. 16E

FIG. 17A

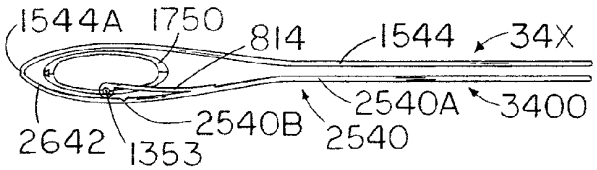
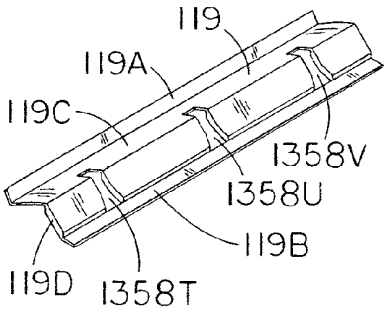


FIG. 17B



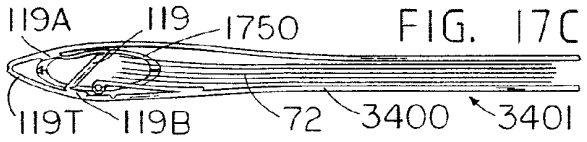


FIG. 17C

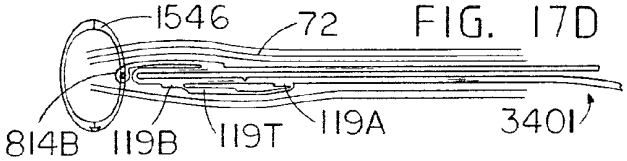


FIG. 17D

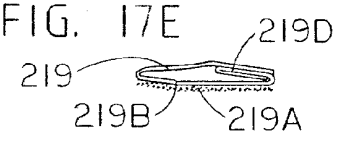


FIG. 17E

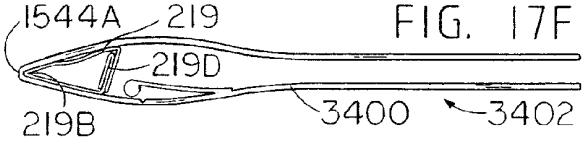


FIG. 17F

FIG. 17G

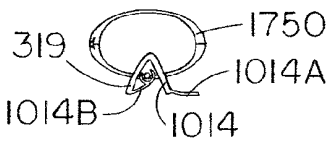


FIG. 17J

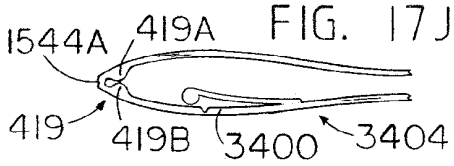


FIG. 17H

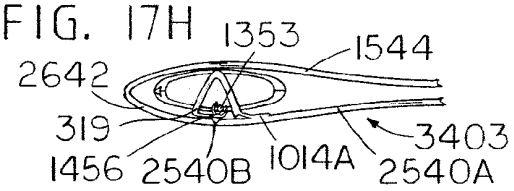


FIG. 17K

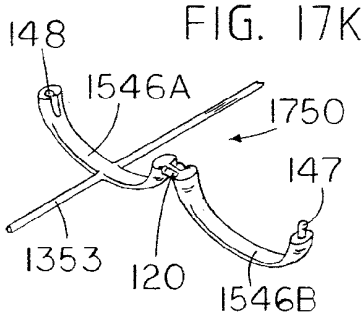
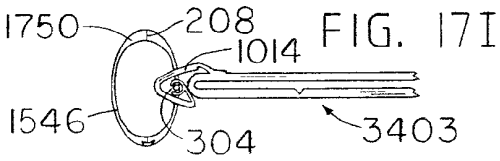


FIG. 17I



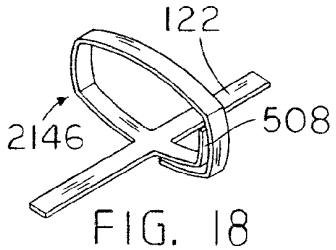


FIG. 18

FIG. 19A

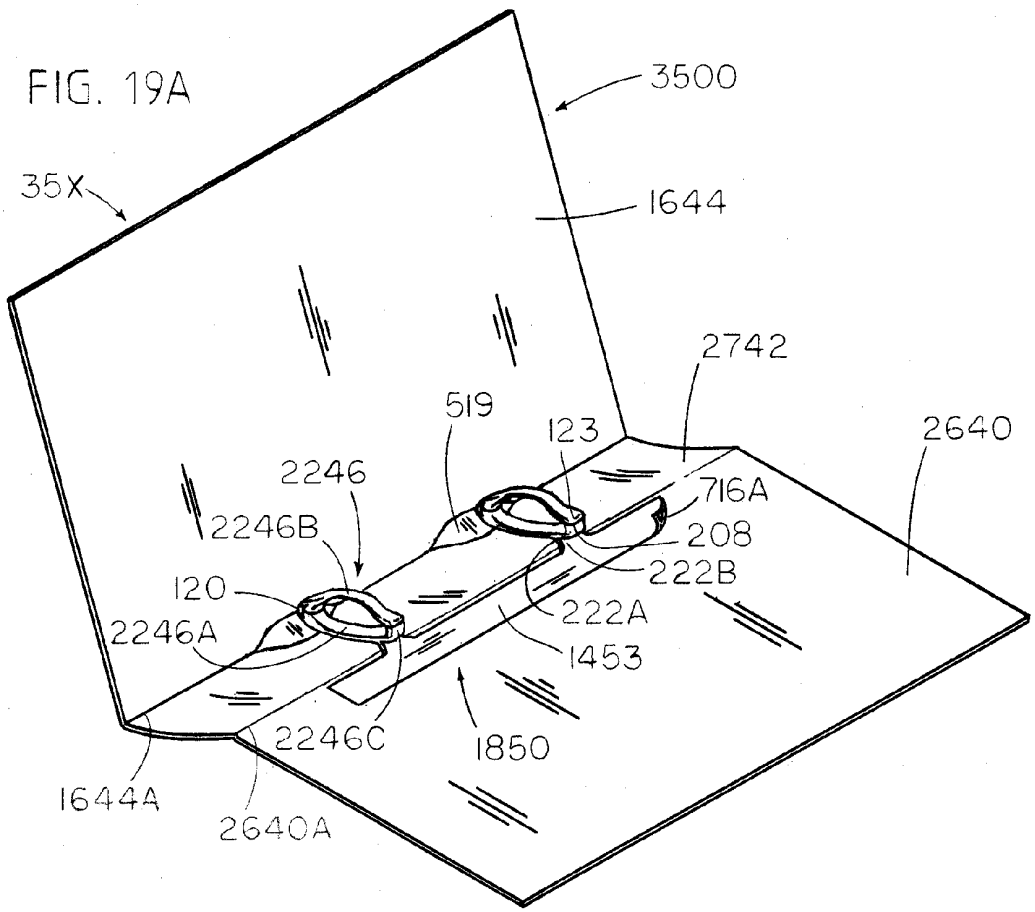


FIG. 19B

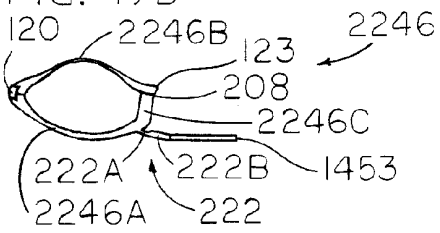


FIG. 21A

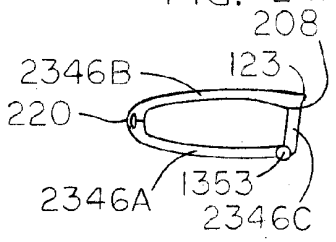


FIG. 20

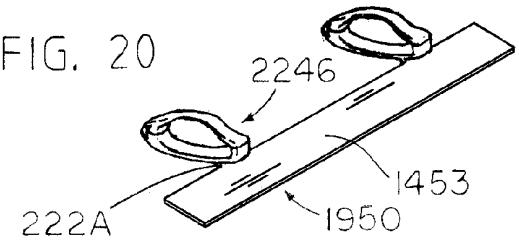
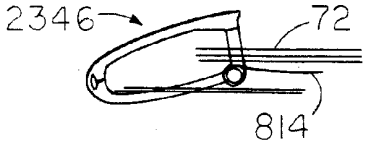


FIG. 21B



LOOSE-LEAF BINDER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 12/054,270 filed Mar. 24, 2008, now abandoned which is a continuation of U.S. patent application Ser. No. 10/796,634 filed on Mar. 8, 2004 now U.S. Pat. No. 7,347,640 which is a continuation-in-part of U.S. application Ser. No. 10/123,000 filed on Apr. 15, 2002, now U.S. Pat. No. 6,702,501 which is continuation-in-part of U.S. application Ser. No. 09/698,838, filed on Oct. 27, 2000, now U.S. Pat. No. 6,371,678 which is continuation-in-part of U.S. application Ser. No. 09/296,377, filed on Apr. 22, 1999, now U.S. Pat. No. 6,196,749 all of which are incorporated herein by reference in their entirety.

FIELD OF INVENTION

This invention relates to loose-leaf binders and analogous products such as loose-leaf personal organizers, loose-leaf flip charts, loose-leaf writing pads and loose-leaf photo albums.

BACKGROUND

Binders generally are comprised of two high-level assemblies, a "skeleton" and cover. The skeleton, as used herein, refers to the chassis of the binder, including the rings, spine and possible actuators, but excluding the cover. The spine, as used herein, refers to the elongated portion of the skeleton on which the rings are mounted; the spine excludes the rings, any transversely protruding elements disposed at the longitudinal ends of the skeleton such as actuation levers or proximate to the attachment points of rings such as springs wrapped around ring bases, and transversely protruding elements which are not fixed to rotate with the elongated portion such as a cover-attachment fastener wrapped about and rotatable about the elongated portion.

One object of loose-leaf binders, which is related to both the skeleton and the cover, is minimization of the "footprint" of the binder. The footprint of a binder is the area that is covered by any part of the binder when the binder is placed upon a generally flat surface. Minimizing a binder's footprint during use efficiently utilizes desk, table, or lap space.

A substitute product, the spiral notebook, specifically addresses this object by letting users flip the front cover and forward pages perfectly flat beneath the back cover and latter pages. However, spiral notebooks do not permit the easy addition or removal of pages.

Conventional loose-leaf binders have a very large footprint because, during use, the front cover is open 180 degrees relative to the back cover. This large footprint causes these binders to be cumbersome during use. Furthermore, if the front cover and forward loose-leaves are flipped behind the back cover and latter loose-leaves of a conventional binder, the forward and latter loose-leaves do not lie flat against the front and back covers, respectively. Large stress is exerted on some loose-leaves causing them to tear out of the binder and the airfoil shape of the stack of forward loose-leaves, front cover, back cover, and latter loose-leaves does not provide a flat writing surface. Furthermore in this case, writing on the topmost loose-leaf is difficult as the stack of loose-leaves bends and springs back under the shifting weight of a writing hand and wrist.

In the prior art, there have been attempts to minimize the footprints of loose-leaf binders during use while eliminating the problems mentioned above for conventional binders. However, each of these attempts has had some failing including: (1) sacrifice of a desired feature, (2) only partial achievement of this functionality, and (3) addition of undesirable characteristics.

The failings of known loose-leaf binders to minimize binder footprints are principally the result of (1) the large transverse cross-section dimensions of spines of known skeletons, (2) the methods employed to attach covers to skeletons, and (3) the design of the covers.

The first main cause of these failings, the large transverse cross-section dimensions of loose-leaf binder skeleton spines, has generally resulted from a common objective of skeletons, the ability to simultaneously open and close all rings of a skeleton via a simple actuation mechanism. SOCRA, which is used herein to describe these skeletons, is an acronym for Simultaneously Openable/Closeable Rings Actuation.

Conventional loose-leaf binders have SOCRA skeletons with spines having transverse cross-sections with major and minor dimensions wherein the large major dimension is built into the perimeter of the rings whereas the minor dimension is substantially radial to the center of the rings. Binder skeleton spines have traditionally had a transverse cross-section with a ratio of major to minor dimensions greater than two.

Conventional loose-leaf binders have a front cover attached to a middle cover which in turn is attached to a back cover. The SOCRA skeleton is rigidly fixed to the middle cover or back cover via rivets.

Exemplary dimensions of conventional loose-leaf binder covers in the market are as follows:

Front and Back Cover Thickness	Middle cover Thickness
2 mm	2 mm
3 mm	4.5 mm
4 mm	5 mm

Typical dimensions of conventional loose-leaf binder skeletons in the market are as follows:

Ring Outer Diameter	Ring Prong Thickness	Skeleton Spine Width
13.5 mm	1 mm	10 mm
21 mm	2 mm	16 mm
32 mm	2.8 mm	25 mm
75 mm	3.5 mm	50 mm

A ring outer diameter differs from its corresponding ring inner diameter by two ring prong thicknesses. Skeleton spine width is the major transverse cross-section dimension of a binder skeleton spine. The widths of skeleton spines are affected and constrained by the SOCRA mechanism employed and ring prong thickness. Note that as ring size increases, prong thickness increases to handle the stronger forces acting on the rings. Because ring prongs are commonly riveted into plates in conventional skeletons, as ring prongs increase in thickness, the skeleton spine width also must increase to secure the thicker prongs. The smallest conventional binders in the market which are small pocket binders have skeleton spine widths that are still 10 mm thick. Because of the thinness of cover segments and thickness of SOCRA

skeleton spines in the prior art, the prior art generally teaches away from embedding of a SOCRA skeleton spine in a binder cover.

The large transverse cross-section of known SOCRA skeleton designs has led to the orientation of the transverse cross-section such that the major dimension is substantially radial to the center of the rings in an attempt to minimize the binder footprint. However, this orientation has made attachment to the cover more difficult which in turn has led to the use of loose-leaf front and back covers with no middle cover disposed therebetween. Such configuration exposes the rings and the ends of the loose-leaves leaving both less protected and makes the binder cumbersome to handle and less attractive. In such a known binder, the skeleton creates an awkward lump, thwarting the object of a flat writing surface, when positioned within a stack of loose-leaves or when positioned between the front cover and back cover after the front cover is flipped around against the back cover. U.S. Pat. Nos. 3,190,293 to Schneider, 4,904,103 to Im and 2,331,461 to Dawson are examples of such known binders.

Alternatively, to minimize binder footprints, some loose-leaf binders have independently-openable rings. In some of these loose-leaf binders, the back cover pivots about the thin skeleton spine and the front cover hangs loose-leaf on the rings, but there is no middle cover joining the front cover to the back cover. These designs make insertion and removal of loose-leaves tedious. Also, the exposed rings are unattractive and the loose-leaves are less protected. U.S. Pat. Nos. 659,860 to Schild and 2,268,431 to Slonneger are examples of such binders.

Yet another problem with known attempts to build a minimal-footprint binder are inadequate ring shapes having varying loose-leaf capacity when these binders are open 360 degrees versus when they are closed. This variation in capacity results from inclusion of the skeleton among the loose-leaves in one position but not in the other. U.S. Pat. No. 4,904,103 to Im is an example of such a binder.

SUMMARY OF INVENTION

Accordingly, this invention provides an improved binder that satisfies the object of providing a binder with a minimal footprint during operation while obviating the disadvantages of the prior art. The invention includes improvements to the binder skeleton, cover and attachment of the skeleton to the cover.

To minimize the binder footprint, the various embodiments of the invention described below contain at least one of the following elements as features:

(1) Skeleton with a minimal LSCPL (defined below).
(2) SOCRA skeleton.
(3) Cover designs that allow the front cover and back cover to fold in flat formations when open 360 degrees while simultaneously allowing the rings to rotate around an edge of the flatly-folded cover.
(4) Spine of skeleton axially disposed relative to rotation of rings and oppositely rotating back cover when the binder is open 360 degrees.
(5) Spine of skeleton embedded or partially embedded in cover in design and/or during operation of binder.
(6) Middle cover joining front cover to back cover.
(7) Attachment of the middle cover to back cover so that the covers do not interfere with rotation of the rings when the binder is opened 360 degrees.
(8) Slots or holes to eliminate interference of cover with skeleton rings as skeleton rings rotate through plane of back cover.

(9) Longest ring dimension is much larger than the LSCPL (defined below).
(10) Attachment of skeleton to cover in a way that allows the front cover to lie flat on the back cover while the binder is open 360 degrees.
(11) Rings hidden (not exposed) when binder is closed.
(12) Writing-support pads (described below).
(13) Stable, incremental rotation of rings about an edge of the flatly-folded cover without a strong bias to particular positions.
(14) Ring shapes with particular orientations to skeleton and cover to optimize or stabilize binder capacity.

The preferred embodiments have a spine. LSCPL is an acronym for the Longest Spine Cross-section Perimeter Line segment and refers to the longest line segment connecting two points on the perimeter of the transverse cross-section of the skeleton spine. For example, for a skeleton spine having a circular cross-section, the LSCPL is the circle's diameter; for an ellipse, the LSCPL is the major axis; for a square or rectangle, the LSCPL is a diagonal; for a triangle, the LSCPL is the longest side of the triangle.

The LSCPL dimension is important. When the binder cover is open 360 degrees, the binder cover is turned inside out such that at least a portion of the interior surfaces of the front and back covers face in opposite directions and the skeleton spine as well as a portion of the cover may be sandwiched between forward and latter loose-leaves. Preferably, the cover folds flat when open 360 degrees. The rings must be able to rotate while the cover is open 360 degrees. In the preferred embodiments, rotation of the rings necessitates that the spine rotate. If the LSCPL dimension is less than or equal to the thickness of the front and back covers, the spine can lie completely between the interior surface planes of the front and back cover throughout the complete range of the spine's rotation; in this case, the spine can remain flush with the front and back cover so that any potential lump caused by the spine while it is sandwiched between forward and latter loose-leaves is minimized or prevented so as to present a flatter top loose-leaf surface. Furthermore, the LSCPL dimension influences the desired thickness of a cover segment having a conduit in which the spine is rotatably disposed as a pivot of cover rotation; as the cover segment rotates about the spine, the conduit containing the spine must accommodate the LSCPL dimension.

Various features of each preferred embodiment cooperate to enable its loose-leaves above and below the back cover to lie flat and parallel when the cover is open 360 degrees whether none, one, many, or all of the loose-leaves are flipped below the back cover.

In the preferred embodiments, a SOCRA skeleton is rotatably disposed in a cover such that (1) the spine is a pivot about which the cover can rotate and (2) the spine is axially disposed relative to opposite rotations of the cover and rings.

Several embodiments of skeletons for use with the binder are disclosed for minimizing the LSCPL. For example, in one embodiment of a skeleton, the rings are attached via a space-saving weld or braze versus the space-demanding riveting of conventional binders.

Embedment of a skeleton in a cover segment without the segment becoming awkwardly thick and unattractive becomes feasible beginning with skeletons having LSCPL values of about 7-9 mm. Most preferably, the LSCPL of the skeleton is less than or equal 5 mm.

Preferably, the binder has a SOCRA skeleton with a synchronized switching element to open or close its rings simultaneously. The preferred synchronized switching element has a first connective element which connects to one set of ring

segments and a second connective element which connects to a corresponding and opposing second set of ring segments. The synchronized switching element has a mechanism to enable the first connective element to move in relation to the second connective element so as to open or close the first ring segments relative to the second ring segments.

Means for attaching the front, middle and back cover segments are also disclosed.

Objects and Advantages

Accordingly, several objects or advantages of my invention contained in various embodiments described below are:

(a) to provide a binder which can minimize its footprint during use by flipping the front cover and any number of forward loose-leaves flatly beneath the back cover and latter loose-leaves and which lacks the limitations and failings of past attempts cited;

(b) to provide a binder which is reversible, so that either side may be used with equal advantages, the reversal being accomplished by opening the binder 360 degrees and then positioning it to access either the back of the exposed forward loose-leaf page or front of the exposed latter page, whereby either or both sides of a page may be written upon;

(c) to provide a binder which always presents a flat writing surface including when the front cover is opened 180 or 360 degrees relative to the back cover, and the whole surface of the current loose-leaf page is flat and can be used from edge to edge and top to bottom;

(d) to provide a binder whose front and back covers and optional writing-support pads may take the place of a desk, offering good support to write upon if the pad is rested in a lap or held in the hand;

(e) to provide an attractive binder with rings hidden when closed;

(f) to provide a binder affording superior protection to loose-leaves via a surrounding cover;

(g) to provide a binder that is easy to handle, conveniently packs in brief cases and book bags and stacks or stands well on a bookshelf;

(h) to provide a binder which reduces tearing stress on its loose-leaf pages when they are flipped beneath the back cover and latter pages;

(i) to provide a thin binder when closed by embedding the skeleton spine in the cover;

(j) To provide a binder with releasably retaining rings to bind loose-leaf pages permitting easy addition or removal of loose-leaf pages as desired;

(k) to provide a binder with the ability to simultaneously open or close all of the binder's rings by a skeleton mechanism to reduce the effort of adding or removing loose-leaf pages;

(l) to provide a binder with the smallest possible LSCPL skeleton value to eliminate or minimize any lump cause by the skeleton when the binder is open 360 degrees but where the skeleton fulfills its requirement to enable simultaneous opening and closing of all rings;

(m) to provide a binder with a skeleton which can accommodate various numbers and spacings of rings;

(n) to provide a binder with a skeleton that is spring urged to or can be locked in either of two stable states, an open position or closed position so its rings do not inadvertently open or close;

(o) to provide a skeleton with a ring shape that provides substantially constant capacity during operation when the skeleton may be rotated from its upright position; and

(p) to provide a binder that can be manufactured cheaply.

Further objects and advantages of my invention will become apparent from consideration of the drawings and ensuing description.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention by way of example and not by way of limitation. The drawings referred to in this specification should be understood as not being drawn to scale except if specifically noted.

FIG. **1**A is a perspective view of an embodiment of the binder of the present invention with its front cover open approximately 120 degrees relative to the back cover in which the spine of the binder skeleton is rotatably disposed.

FIG. **1**B is a perspective view of the binder of FIG. **1**A in its closed position.

FIG. **1**C is a perspective view of the binder of FIG. **1**A with the front cover and forward loose-leaf pages flipped 180 degrees open relative to the back cover.

FIG. **1**D is a perspective view of the binder of FIG. **1**A with the front cover and forward loose-leaf pages flipped approximately 360 degrees to a fully open position flatly beneath the back cover and latter loose-leaf pages.

FIG. **1**E is a cross-sectional view of the binder of FIG. **1**D along line **1**E-**1**E in FIG. **1**D.

FIG. **1**F is a sectional view of the binder of FIG. **1**E after it has been flipped over 180 degrees to enable writing on the back side of a forward loose-leaf page.

FIG. **1**G is a perspective view of the skeleton of FIG. **1**A with the rings closed.

FIG. **1**H is a perspective view of the skeleton of FIG. **1**A with the rings open.

FIG. **2**A is a perspective view of another embodiment of the binder in the closed position where its front cover rides loose-leaf on its rings but is also connected to its middle cover by an attachment seam that is exterior to the binder rings.

FIG. **2**B is a cross-sectional view of FIG. **2**A indicated by the section lines **2**B-**2**B in FIG. **2**A.

FIG. **2**C is a perspective view of the binder of FIG. **2**A with loose-leaf pages removed and with the front cover flipped 180 degrees open relative to the back cover while the middle cover folds along an 180-degree-open crease.

FIG. **2**D is the cross section of FIG. **2**B where the front cover and forward loose-leaf pages have been flipped 180 degrees open relative to the back cover and the middle cover folds along a 180-degree-open crease.

FIG. **2**E is the cross section of FIG. **2**B where the front cover and forward loose-leaf pages have been flipped 360 degrees flatly beneath the back cover and latter loose-leaf pages and the middle cover folds along a 360-degree-open crease.

FIG. **3**A is a bottom view of another embodiment of the binder in a closed position having a flexible middle cover and a skeleton with a conventional arc-shaped spine which is firmly attached to the cover via a staple-thin rivet and is able to rotate via the flexibility of the middle cover.

FIG. **3**B is a bottom view of the binder of FIG. **3**A with its front cover open 360 degrees and with all its loose-leaves resting above the back cover.

FIG. **3**C is a bottom view of the binder of FIG. **3**A, but with its front cover, a writing-support pad, and one forward loose-leaf flipped beneath the back cover and latter loose-leaves.

FIG. **3**D is a bottom view of the binder of FIG. **3**A, but with its front cover, a writing-support pad, and half the loose-leaves flipped beneath the back cover and remaining half of the loose-leaves.

FIG. **3**E is a bottom view of the binder of FIG. **3**A, but with its front cover, a writing-support pad, and all but one forward loose-leaf flipped beneath the back cover and the one remaining latter loose-leaf.

FIG. **4**A is a bottom view of another embodiment of the binder in the closed position which is similar to the binder **23** but with a thinner, more flexible middle cover and a conventional round rivet that attaches its skeleton to its middle cover.

FIG. **4**B is a bottom view of the binder of FIG. **4**A, but with its front cover, a writing-support pad, and one forward loose-leaf flipped beneath the back cover and latter loose-leaves.

FIG. **4**C is a bottom view of the binder of FIG. **4**A, but with its front cover, a writing-support pad, and half the loose-leaves flipped beneath the back cover and remaining half of the loose-leaves.

FIG. **5**A is a bottom view of another embodiment of the binder in the closed position which has the same skeleton as the binders **23** and **24**, but whose skeleton rotates via a hinge joint in its back cover.

FIG. **5**B is a bottom view of the binder of FIG. **5**A, but with its front cover, a writing-support pad, and one forward loose-leaf flipped beneath the back cover and latter loose-leaves.

FIG. **6**A is a perspective view of another embodiment of a skeleton for use with the binder that has its rings closed.

FIG. **6**B is a bottom view of a ring component of the skeleton of **6**A.

FIG. **6**C is a partial, cross-sectional view of FIG. **6**A indicated by the section lines **6**C-**6**C in FIG. **6**A.

FIG. **7**A is a bottom view of another embodiment of a ring for use with the binder that has a partially elliptical shape with three linear top segments.

FIGS. **7**B-**7**F are bottom views of the binder of FIG. **1** with its rings replaced with rings of FIG. **7**A; FIGS. **7**B-**7**F depict skeleton rotation and related cover positions as the front cover, writing-support pad, and varying numbers of forward loose-leaves are flipped beneath the back cover and varying number of latter loose-leaves.

FIG. **8** is a bottom view of another embodiment of a ring for use with the binder that has a partially elliptical shape with two linear top segments.

FIG. **9** is the bottom view of another preferred embodiment of a ring component.

FIG. **10** is the bottom view of another preferred embodiment of a ring component.

FIG. **11**A is a perspective view of another preferred embodiment of a conduit casing for use with the binder.

FIG. **11**B is a perspective view of another preferred embodiment of a cover for use with the binder incorporating the conduit casing of FIG. **11**A.

FIG. **12**A is a perspective view of another preferred embodiment of a cover for use with the binder with an extra thin closed-cover thickness.

FIG. **12**B is a bottom view of another preferred embodiment of the binder employing the cover of FIG. **12**A and skeleton of FIGS. **12**D-**12**E and positioned with its cover closed.

FIG. **12**C is a bottom view of the binder of FIG. **12**B positioned with its front cover flatly opened 360 degrees relative to its back cover.

FIG. **12**D is a bottom view of another preferred embodiment of a skeleton for use with the binder with oblong elliptical rings.

FIG. **12**E is a perspective view of a portion of the skeleton of FIG. **12**D as initially molded as a single piece of plastic.

FIG. **13**A is a bottom view of another preferred embodiment of a cover for use with the binder with an extra thin closed-cover thickness and with a conduit casing having an instant user-sealed wrap-flap closure facilitating skeleton selection by user.

FIG. **13**B is a bottom view of another preferred embodiment of the binder incorporating the cover of FIG. **13**A and skeleton of FIG. **12**E and is positioned with its front cover flatly opened 360 degrees relative to its back cover with ring-bound loose-leaves added.

FIG. **14**A is a bottom view of another preferred embodiment of a cover for use with the binder with an extra thin closed-cover thickness and with a conduit casing having an instant user-sealed wrap-flap closure.

FIG. **14**B is a bottom view of another preferred embodiment of the binder incorporating the cover of FIG. **14**A and skeleton of FIG. **12**E and is positioned with its front cover flatly opened 360 degrees relative to its back cover.

FIG. **15**A is a perspective view of another preferred embodiment of the binder incorporating the skeleton of FIG. **12**E and having instant user-affixed attachment strips for permanent placement upon folder surfaces.

FIG. **15**B is a perspective view of a typical folder to which the binder of FIG. **15**A can be attached and indicates preferred attachment locations.

FIG. **16**A is a perspective view of a preferred embodiment of a subassembly comprising a conduit casing joined to another preferred embodiment of a skeleton for use with the binder.

FIG. **16**B is a perspective view of another preferred embodiment of a ring for use with the binder and which is reversibly compressible.

FIG. **16**C is a bottom view of another preferred embodiment of the binder, which is situated under vertical compression with ring-bound loose-leaves and which has an ultra thin closed-cover thickness made possible by reversibly compressible rings of FIG. **16**B.

FIG. **16**D is a bottom view of the binder of FIG. **16**C positioned with its front cover opened 360 degrees relative to its back cover in a flat formation with its ring-bound loose-leaves.

FIG. **16**E is a bottom view of another preferred embodiment of a conduit casing for use with the binder.

FIG. **17**A is a bottom view of another preferred embodiment of the binder featuring an ultra thin aesthetically-pleasing streamline closed cover contour via compressible rings of FIG. **17**K synergistically combined with a cover having a primary cover fold.

FIG. **17**B is a perspective view of a preferred embodiment of a ring-crush resister for use with the binder.

FIG. **17**C is a bottom view of another preferred embodiment of the binder situated under vertical compression with ring-bound loose-leaves and featuring an ultra thin closed-cover thickness and the ring-crush resister of FIG. **17**B.

FIG. **17**D is a bottom view of the binder of FIG. **17**C positioned with its front cover open 360 degrees relative to its back cover in a flat formation with its ring-bound loose-leaves.

FIG. **17**E is a bottom view of another preferred embodiment of a ring-crush resister for use with the binder.

FIG. **17**F is a bottom view of another preferred embodiment of a cover for use with the binder featuring an ultra thin closed-cover thickness and the ring-crush resister of FIG. **17**E.

FIG. **17**G is a bottom view of another preferred embodiment of a subassembly comprising a integral combination conduit casing ring-crush resister joined to the skeleton of FIG. **17**K for use with the binder.

FIG. **17**H is a bottom view of another preferred embodiment of the binder situated under vertical compression with an ultra thin closed-cover thickness and incorporating the subassembly of FIG. **17**G.

FIG. **17**I is a bottom view of the binder of FIG. **17**H positioned with its front cover opened 360 degrees relative to its back cover in a flat formation.

FIG. **17**J is a bottom view of another preferred embodiment of a cover for use with the binder with an ultra thin closed-cover thickness and featuring another preferred embodiment of a ring-crush resister.

FIG. **17**K is a perspective view of another preferred embodiment of a skeleton for use with the binder featuring reversibly compressible rings with flip-top hinges as initially molded as a single piece of plastic.

FIG. **18** is a perspective view of another preferred embodiment of an oblong ring for use with the binder featuring a spiral closure.

FIG. **19**A is a perspective view of another preferred embodiment of a binder featuring an ultra thin aesthetically-pleasing streamline closed cover contour via compressible rings with both essential and optional components separately fused.

FIG. **19**B is a bottom view of ring **2246** in FIG. **19**A.

FIG. **20** is a perspective view of another preferred embodiment of a skeleton of the binder of the present invention with rings attached more closely to spine via elastic-hinge.

FIGS. **21**A-**21**B are bottom views of another preferred embodiment of a ring of the binder of the present invention.

DETAILED DESCRIPTION

Various features of each preferred embodiment cooperate to enable its loose-leaves above and below the back cover to lie flat and parallel when the cover is open 360 degrees whether none, one, many, or all of the loose-leaves are flipped below the back cover.

In one embodiment, a binder has a cover, a plurality of oblong binder rings that are each closable from an open position via an interlock closure, a connective element having at least one pivot means for pivoting the oblong binder rings about the main axis of rotation. The connective element joins together and aligns the oblong binder rings along the main axis of rotation. At least one of the oblong binder rings elastically closable from an open position while continually remaining within a single geometric plane. Each of the oblong binder rings has a major diameter and a minor diameter. The main axis of rotation is perpendicular to each of the oblong binder rings and is located adjacent one side of each of the oblong binder rings as divided by the minor diameter. The minor diameter defines an upright ring position when the minor diameter is substantially vertical and the main axis of rotation is located below the major diameter. The pivot means perpendicularly joins the connective element to at least a ring one of the oblong binder rings adjacent one side of a bottom portion thereof enabling the ring one to stand upright when the pivot means is horizontal. The oblong binder rings maintain an oblong shape whenever closed such that the major diameter is preferably always at least 1.5 times longer than the minor diameter whenever the oblong binder rings are closed and are subject to normal usage. The cover enwraps and shields most of the perimeter of each of the oblong binder rings when the cover is closed such that each of 270 rays emanating from the center of a first ring of the oblong binder rings is spaced at consecutive 1-degree angular increments and intersects the perimeter of the first ring and subsequently intersects the cover when the cover is closed. The cover is folded in a substantially flat formation with a near-ring edge adjacent the oblong binder rings when the cover is open 360 degrees. A portion of each of the oblong binder rings rotatable about the near-ring edge. The main axis of rotation is roughly axially disposed relative to opposing rotations of the cover and the ring one while the ring one remains closed, such that the arrangement of the pivot means with the oblong binder rings facilitates limited rotational attachment of the oblong binder rings to the cover, enables the cover to be extra thin when closed thus saving storage space, enables nimble page-turning of ring-bound loose-leaves when the cover is open 180 degrees, and reduces the amount of necessary rotation of the oblong binder rings when ring-bound loose-leaves are stack substantially flat above and below the pivot means when the cover is open 360 degrees.

In another embodiment, the loose-leaf binder is composed of a cover, a plurality of oblong binder rings that are each elastically closable from an open position via an interlock closure, at least one elastic pivot, and at least one flat orthogonal base. Each of the oblong binder rings has a major diameter and a minor diameter. The minor diameter defines an upright ring position when the minor diameter is substantially vertical. The cover has an inner surface and outer surface when closed. The flat orthogonal base is affixed flatly to the inner surface of the cover. The flat orthogonal base is attached to at least ring one of the oblong binder rings via the elastic pivot enabling the ring one to stand upright when the flat orthogonal base is horizontal. The cover is made up of a back cover, a middle cover, and a front cover, where the middle cover joins the back cover to the front cover. The back cover is separated from the middle cover by an edge-fold. The flat orthogonal base and the ring one straddle the edge-fold. The middle cover supports the ring one when the middle cover is extended flatly away from the back cover on a flat surface. The cover enwraps and shields most of the perimeter of each of the oblong binder rings when the cover is closed such that each of 270 rays emanating from the center of a first ring of the oblong binder rings is spaced at consecutive 1-degree angular increments and intersects the perimeter of the first ring that subsequently intersects the cover when the cover is closed. The cover is folded in a flat formation with the edge-fold adjacent the oblong binder rings when the cover is open 360 degrees A portion of each of the oblong binder rings rotatable about the edge-fold when the cover is open 360 degrees.

In another embodiment, the loose-leaf binder is composed of a plurality of binder rings, a cover (comprising a front cover and a back cover), a primary fold, and at least one fold-intersecting ring-crush resister. The primary fold is located between the front cover and the back cover when the cover is extended flatly open 180 degrees. The primary fold dividing into two folds that border opposite sides of an area of the cover to define the fold-intersecting ring-crush resister. The fold-intersecting ring crush resister disposed adjacent to at least a ring one of the binder rings. The fold-intersecting ring-crush resister is roughly perpendicular to the front cover and the back cover when the cover is folded closed along the primary fold, whereby the fold-intersecting ring-crush resister acts as a physical obstacle to oppose excessive deformation of adjacent the ring one caused by large compressive forces exerted on exterior surfaces of the cover when the cover is closed.

In yet another embodiment, the loose-leaf binder is composed of a skeleton having a spine and a plurality of oblong

binder rings and an instant user-affixed adhesive attachment for attaching the spine to a surface. The skeleton is a single piece of molded plastic and each of the oblong binder rings has an interlock closure and is closable from an open position. Each of the oblong binder rings has a major diameter, a minor diameter and a ring perimeter when closed, the interlock closure comprises a tab and a slot. The tab fits substantially flush within the slot so as not to protrude substantially beyond the ring perimeter enabling ring-bound loose-leaves to slide along the ring perimeter unobstructed by the tab and the slot. The spine has a substantially planar portion, which has the instant user-affixed adhesive attachment. The minor diameter defines an upright ring position when the minor diameter is substantially vertical. The spine perpendicularly attached to each of the oblong binder rings allows each of the oblong binder rings to stand upright when the planar portion of the spine is horizontal, whereby the instant user-affixed adhesive attachment offers ready, quick and easy mounting of the skeleton upon a user-selected complementary cover such as a file folder. Special shape of the oblong binder rings facilitates attachment thereof to the complementary cover that is extra thin to save storage space while preserving nimble page-turning of ring-bound loose-leaves when the complementary cover is open 180 degrees. Flush fitting of the tab and the slot eases ring closure and improves the oblong binder ring appearance.

In another embodiment, the pivot means of the binder has an elastic pivot and a flat orthogonal base. The elastic pivot is disposed between the flat orthogonal base and the ring one. The flat orthogonal base is disposed adjacent the near-ring edge of the cover.

In yet another embodiment, the pivot means of the cover of the binder has a conduit and a spine. The spine is rotatably disposed in the conduit as a pivot about which the cover is rotatable. The conduit is disposed adjacent to the near-ring edge.

In another embodiment, the pivot means of the binder has an elastic pivot. In this embodiment, the cover, the connective element, and oblong rings are formed of a single piece of molded plastic such that the connective element is fused with the cover and the oblong rings extend from the cover via at least one elastic pivot.

In another embodiment, at least one of the oblong binder rings of the binder has a protruding paper-catch ring-edge and/or has a flip-top hinge.

In another embodiment, each of the binder rings has roughly-vertical column-like stiff portions when situated in the upright ring position; has a roughly-horizontal bow-like flexible upper portion when situated in the upright ring position; has a roughly-horizontal lower portion when situated in the upright ring position; is reversibly compressible relative to a moderate compressive force roughly exerted in the direction of the minor diameter such that the column-like stiff portions resist permanent buckling while the bow-like flexible upper portions more readily flatten and widen outward to provide much of desired reversible vertical compressibility. Each of the binder rings springs back to resume a relaxed expanded form upon removal of the moderate compressive force.

In yet another embodiment, each of the binder rings has an oblong perimeter having a major diameter and a minor diameter, the primary cover fold comprises a pair of folds effectively acting as one fold; distance between the pair of folds less than half of the minor diameter, maximum distance between the two folds that border opposite sides of the area of the cover preferably greater than half of the minor diameter. FIGS. **1**A-**1**H

A preferred embodiment of the binder **1** of the present invention is illustrated in FIGS. **1**A-**1**D (perspective views of the binder **1** open 120 degrees, 0 degrees, 180 degrees, and 360 degrees, respectively), FIGS. **1**E-**1**F (bottom views of the binder **1** open 360 degrees), and FIGS. **1**G-**1**H (perspective views of the skeleton **50** of the binder **1**). The binder **1** comprises cover **100** and skeleton **50** with optional loose-leaf writing-support pads **61**A and **61**B.

Cover **100** includes back cover **40**, middle cover **42**, and front cover **44**. Back cover **40** has interior surface **40**N and exterior surface **40**X and front cover **44** has interior surface **44**N and exterior surface **44**X. Back cover **40**, middle cover **42** and front cover **44** are typically made of cardboard, plastic, or other semi-rigid material that is optionally covered by a more flexible material such as vinyl or leather, but may be composed of any materials used to manufacture binder covers, loose-leaf flip-chart covers, loose-leaf personal organizer covers, or loose-leaf writing-pad covers.

Skeleton **50** comprises the spine **53** and a plurality of rings **46**. Rings **46** have ring segments **46**A and **46**B. Spine **53** includes tube **54** and inner rod **52**. Ring segments **46**B are disposed on tube **54** and ring segments **46**A, complementary with ring segments **46**B, are disposed on inner rod **52**. Spine **53** has a synchronized switching element **51** that simultaneously opens or simultaneously closes ring segments **46**A relative to ring segments **46**B. Ring segments **46**A and ring segments **46**B are disposed perpendicular to spine **53**.

Conduit **56** is defined by the back cover **40** and is proximate to and runs substantially parallel with the edge **40**A of back cover **40**. The spine **53** of the skeleton **50** is rotatably disposed within conduit **56**. Spine **53** is a pivot about which back cover **40** can rotate. Rings **46** are constrained to rotate with spine **53**. Because spine **53** is a pivot of back cover **40** and rings **46** rotate with spine **53**, spine **53** is axially disposed relative to opposite rotations of back cover **40** and rings **46**. Slots **58**A-**58**C are cut perpendicularly into the edge **40**A of back cover **40**. Back cover **40** defines paper margin supports **60**A-**60**D. The purpose of slots **58**A-**58**C which intersect conduit **56** and that of margin supports **60**A-**60**D will become apparent in the explanation of the operation of the binder **1**.

The rings **46** are aligned with their respective slots **58**A-**58**C so that at least a portion of each of the rings **46** is both received in and protrudes from one of the slots **58**A-**58**C and thereby allowing spine **53** to be rotatably disposed within the back cover **40**. Preferably, the tube **54** of spine **53** is constructed to have a relatively small cross-sectional dimension so that back cover **40** need not be unduly thick to define a conduit **56** large enough to receive the tube **54**. Preferably, the cross-sectional dimension of tube **54** ranges from about 4 mm to about 9 mm and more preferably from about 4 mm to 7 mm.

One edge of middle cover **42** merges into the plane of back cover **40** along seam **66** which is parallel to conduit **56**. Seam **66** can be located between conduit **56** and the far parallel edge **40**B of back cover **40** but is preferably located near conduit **56** without intersecting slots **58**A-**58**C. The other edge of middle cover **42** interfaces to an edge of front cover **44**. There need not be a distinct boundary distinguishing middle cover **42** and front cover **44**, but often there is one in the form of a seam, crease, or hinge. Optional pads **61**A and **61**B can be placed loose-leaf on rings **46** between which loose-leaves **72** may be added. The binder **1** has a loose-leaf stack space **79** which is the space available for occupation by loose-leaves **72** concurrently bound on rings **46** when the cover **100** is closed.

FIGS. **1**G-**1**H show perspective views of skeleton **50** and its components. FIGS. **1**G and **1**H are perspective views of the skeleton **50** with rings **46** closed and open, respectively. A plurality of ring segments **46**A are attached to rod **52** via a

weld, braze, adhesive or other appropriate means; similarly, a corresponding number of ring segments **46**B are attached to tube **54**. When rod **52** is assembled within tube **54**, the spaced ring segments **46**A protrude through similarly spaced slots **55** defined by tube **54**. Preferably, the width of slots **55** approximates the cross-sectional diameter of ring segments **46**A, or guide mechanisms of some type—such as cylindrical grooves cut into the inner surface of tube **54** with complementary cylindrical flanges attached to rod **52**—are provided to constrain rod **52** from moving longitudinally relative to tube **54**. Slots **55** are cut long enough to enable tube **54** to concentrically rotate about rod **52** through a limited angle without interference from ring segments **46**A. Tube **54** can be rotated about rod **52** to open or close ring segments **46**A relative to ring segments **46**B. In this embodiment of a skeleton **50**, rod **52** and tube **54** serve as first and second connective elements, respectively, of synchronized switching element **51**. Rod **52** is rotated relative to tube **54** to open or close rings **46** together.

There are four fundamental operations of the binder **1**, (i) opening or closing front cover **44** relative to back cover **40** to see and access the contents of the binder **1**; (ii) writing on loose-leaf sheets; (iii) opening or closing rings **46** to insert or remove loose-leaf items such as paper and pocket folders; and (iv) handling and storage of the binder including carrying it in hand, standing it on a bookshelf, packing it in briefcases or bookbags, and stacking it horizontally.

The binder **1** is opened like a book from its closed position (FIG. **1**B) by spreading its front cover **44** and back cover **40** apart (FIG. **1**A) and, in so doing, usually rotating middle cover **42** relative to back cover **40** and front cover **44**. As shown in FIGS. **1**D-**1**F, the front cover **44** and forward loose-leaves **72**A can be disposed flatly beneath the back cover **40** of binder **1** and latter loose-leaves **72**B to minimize the footprint of the binder **1** during use. When front cover **44** and forward loose-leaves **72**A are pulled beyond 180 degrees relative to back cover **40**, skeleton **50** is able to rotate to accommodate this extended range of motion and thus prevents stress on loose-leaves **72** that could cause them to tear out of the rings **46**. The rotation of skeleton **50** also enables forward loose-leaves **72**A to lay flat against front cover **44** to provide flat writing surfaces when the binder **1** is open 360 degrees (FIGS. **1**E and **1**F).

Open slots **58**A-**58**C are defined by the back cover **40** which allow the rings **46** to (i) stand upright when the back cover **40** is closed and (ii) rotate along with the skeleton **50**. When the binder is open 180 degrees, skeleton **50** is able to rotate several degrees, typically 5-20 degrees, relative to its upright position because of slots **58**A-**58**C in back cover **40** but is stopped from rotating further by middle cover **42** which presses up against slots **58**A-**58**C when the middle cover **42** is supported by a flat surface. Since middle cover **42** is connected to back cover **40** between conduit **56** and the far parallel edge **40**B of back cover **40**, when front cover **44** is open 360 degrees relative to back cover **40**, middle cover **42** is pulled away from slots **58**A-**58**C and allows for maximum rotation of the rings **46** through the slots **58**A-**58**C. When cover **100** is folded open 360 degrees in a flat formation, a portion of each ring **46** is rotatable about near-ring edge **40**A, the pertinence of which is explained below. The angle of rotation of skeleton **50** from its upright position is determined by the relative number of forward loose-leaves **72**A flipped beneath back cover **40** to latter loose-leaves **72**B; i.e. the more loose-leaves **72** flipped beneath, the greater is the angle of rotation of skeleton **50** from its upright position. Other factors determining the angle that skeleton **50** rotates from its upright position are the diameter of rings **46**, the thickness of back cover **40**, and whether the binder is placed on a surface with the back cover **40** over front cover **44** (FIG. **1**E) or vice versa (FIG. **1**F).

A portion of each ring **46** being rotatable about near-ring edge **40**A of the flatly-folded cover **100** serves two purposes: (1) it enables loose-leaves **72** to clear edge **40**A as they are moved from one side of the back cover **40** to the other side while bound on rings **46** and (2) it enables a first variable segment of each ring **46** to be located on the interior side of back cover **40** while a second variable segment of each ring **46** is concurrently located on the exterior side of back cover **40** which is necessary to enable loose-leaves **72** stacked flatly and bound on rings **46** above back cover **40** to be substantially parallel to loose-leaves **72** stacked flatly and bound on rings **46** below back cover **40**. For purpose (2) above to be possible, the inner diameter of each ring **46** must be greater than the thickness of the flat formation of cover **100** which equals the sum of the thicknesses of front cover **44** and back cover **40** which are placed together when cover **100** is open 360 degrees in the flat formation.

The front cover **44** may be flexible enough or may have a fold or hinge such that it may be folded against itself while it is flipped back against back cover **40** in order to further reduce the footprint of the binder **1**.

FIG. **1**C shows that users can write on the front or back of any loose-leaf **72** when the binder **1** is open 180 degrees. Likewise, when front cover **44** and forward loose-leaves **72**A are flipped back against back cover **40** and latter loose-leaves **72**B, the user can write on either the front side of the exposed latter loose-leaf **72**B or the back side of the exposed forward loose-leaf **72**A by positioning the binder as illustrated in FIGS. **1**E and **1**F, respectively. In this manner, the binder **1** of the present invention allows the user to write on the front or back of any loose-leaf **72** with the minimal binder footprint.

Whenever skeleton **50** is rotated from its upright position, the margin supports **60**A-**60**D provide support for writing so that almost the entire surface of loose-leaves **72** from left edge to right edge and from top to bottom can be written upon. Pads **61**A-**61**B which also assist in this writing-support effort are likely to be only semi-rigid and thus benefit from the added support of margin supports **60**A-**60**D in providing a flat, well-supported, writing surface. The support provided by both margin supports **60**A-**60**D and loose-leaf writing-support pads **61**A-**61**B help to prevent puncturing loose-leaves **72** during writing.

Rotatably disposing spine **53** of skeleton **50** within back cover **40**, outside of the loose-leaf stack space **79**, provides for a flat writing surface when front cover **44** and any forward loose-leaves **72**A are rotated either 180 degrees with respect to back cover **40** or approximately 360 degrees against the underside of back cover **40** and latter loose-leaves **72**B. Spine **53** must be able to rotate with respect to the back cover **40** and be planar therewith in order to avoid the creation of uneven writing surfaces.

Skeleton **50** of FIG. **1**A includes a synchronized switch element **51** to simultaneously open all rings **46** to an open state (FIG. **1**H) or to simultaneously close all rings **46** to a closed state (FIG. **1**G). Opening skeleton **50** involves separating the interfacing free ends of ring segments **46**A and ring segments **46**B which permits the reception or removal of the loose-leaf sheets (FIG. **1**H). Closing skeleton **50** involves adjoining the free ends of ring segments **46**A and ring segments **46**B to form completely closed rings **46** that secure the loose-leaf sheets within the binder (FIG. **1**G).

To open skeleton **50**, any two opposing ring segments **46**A and **46**B are pulled apart by the user's fingers. This action triggers the synchronized switch element **51** to open all of the

rings **46** simultaneously. A detailed mechanism showing additional components that enable synchronized switching element **51** to maintain rings **46** in a stable open state or stable closed state is disclosed in U.S. Pat. No. 6,371,678 (Chizmar). To close skeleton **50**, any two opposing ring segments **46**A and **46**B are pushed together by the user's fingers which again triggers the synchronized switching element **51** to close all of the rings **46** simultaneously.

The binder cover **100**, when closed, almost completely encompasses loose-leaves **72** and skeleton **50** including rings **46** and thus resembles a book. The encompassing is such that each of 270 rays emanating from the center of one of the rings **46** and spaced at consecutive 1-degree angular increments and intersecting the perimeter of that ring **46** subsequently intersects the cover **100** when the cover **100** is closed. Consequently, it is easier to stand the binder **1** on a shelf, it is less awkward to carry, it is easier to store in containers such as book shelves, brief cases, and back packs, it is more attractive, and it provides more protection to the loose-leaf pages 72 than a binder with a less enveloping cover, such as those with exposed rings.

FIGS. **2**A-**2**E

FIGS. **2**A-**2**E show perspective and sectional views of another preferred embodiment of a binder **2** of the present invention. The binder **2** comprises cover **200** and skeleton **50**. Cover **200** includes front cover **144**, middle cover **142**, and back cover **40**. The binder **2** comprises the same back cover **40** and skeleton **50** as the binder **1** shown in FIGS. **1**A-**1**H, but incorporates a different middle cover **142** and front cover **144**. Front cover **144** defines holes **74**A for receiving rings **46** thereby enabling front cover **144** to be releasably bound by rings **46** in the same manner that loose-leaves **72** are releasably bound by the rings **46**. Front cover **144** is connected to middle cover **142** via seam **166** which is disposed between holes **74**A and the far parallel edge **144**A of front cover **144**. The preferred location of seam **166** is nearer holes **74**A than the far edge **144**A of front cover **144**. Middle cover **142** has crease **80** and crease **82** and connects to back cover **40** as in the binder **1** as shown in FIGS. **1**A-**1**C.

Because front cover **144** rides loose-leaf on rings **46**, rings **46** constrain the motion of front cover **144**. When the binder **2** is opened 180 degrees and placed on a surface or when the binder **2** is opened 360 degrees, rings **46** constrain front cover **144** which in turn forces middle cover **142** to fold upon itself. To encourage smooth folding with a minimal resulting lump, creases **80** and **82** are preferably formed in middle cover **142**. When the binder **2** is opened 180 degrees, middle cover **142** tends to fold along crease **80** and when the binder **2** is opened 360 degrees, middle cover **142** tends to fold along crease **82**. For illustrative purposes, middle cover **142** has noticeable thickness in FIGS. **2**A-**2**E; in practice middle cover **142** can be paper-thin to minimize any lump it creates when the binder **2** is open 360 degrees. FIG. **2**E shows the minimal resulting footprint of the binder **2** provided when cover **200** is open 360 degrees in a flat formation between forward loose-leaves **72**A and latter loose-leaves **72**B. For purpose (2) recited earlier in the description of the binder **1** shown in FIGS. **1**A-**1**F, the inner diameter of rings **46** is substantially greater than the thickness of the flat formation of cover **200** which equals the sum of the thickness of back cover **40** plus the thickness of front cover **144** plus twice the thickness of middle cover **142**.

Another advantage of the binder **2** of the present invention is more compact storage due to less wasted interior space of the binder. Since front cover **144** rests flatly on loose-leaves **72** when the binder is closed (FIGS. **2**A and **2**B), there is no air pocket between the top loose-leaf **72** and front cover **144**. This advantage is significant when considering the limited space of a briefcase or bookbag. The binder **2** of the present invention provides the advantages of an enveloping cover for the rings **46** while creating only a minimal footprint when opened approximately 180 degrees or 360 degrees.

FIGS. **3**A-**3**E

FIGS. **3**A-**3**E are bottom views of yet another preferred embodiment of a binder **23** of the present invention. The binder **23** comprises skeleton **550**, one or more staple-thin fasteners **68** and cover **2300**. Cover **2300** includes front cover **1144**, middle cover **1842** and back cover **1640**. Middle cover **1842** has middle cover portions **1842**A-**1842**C. Skeleton **550** includes spine **553** and rings **746**.

Conventional spine **553** has an arc-shaped cross-section and has a switching element to simultaneously open and close rings **746**. Skeleton **550** is fixed to middle cover portion **1842**B via one or more staple-thin fasteners **68**. Middle cover portion **1842**B is of reduced thickness relative to middle cover portion **1842**A and middle cover portion **1842**C preferably creating recess **71** to contain spine **553**. Recess **71** aids in providing a flat writing surface when the binder **23** is open 180 degrees by lowering spine **553** partially into the plane of front cover **1144** and back cover **1640**. The reduced thickness of middle cover portion **1842**B also facilitates its greater flexibility relative to middle cover portions **1842**A and **1842**C enabling it to have a small radius of curvature illustrated in FIGS. **3**C-**3**E such that middle cover portion **1842**A is able to lie flatly against middle cover portion **1842**C. Furthermore, fastener **68** is purposefully staple-thin so as not to hinder the folding of middle cover **1842**. The folding of middle cover **1842** creates a transient near-ring edge **73** in cover **2300**. To facilitate the flipping of front cover **1144** and one or more forward loose-leaves **72**A 360 degrees such that they lie parallel to back cover **1640** and latter loose-leaves **72**B, skeleton **550** must be able to incrementally rotate in a stable and controlled manner relative to front cover **1144** and back cover **1640**. Because skeleton **550** is fastened to middle cover portion **1842**B, it cannot freely rotate relative to middle cover portion **1842**B; but skeleton **550** rotates relative to front cover **1144** and back cover **1640** via the flexibility of middle cover portion **1842**B. As illustrated in FIGS. **3**C-**3**E, skeleton **550** is not strongly biased to a particular angular position when front cover **1144** is flipped 360 degree beneath back cover **1640** and can incrementally rotate as needed depending upon the number of forward loose-leaves **72**A to be flipped beneath back cover **1640**; back cover **1640** and middle cover portion **1842**A slide against front cover **1144** and middle cover portion **1842**B to facilitate the amount of necessary rotation of skeleton **550**. Staple-thin fasteners **68** can be affixed loosely to allow freer rotation of skeleton **550** relative to middle cover portion **1842**B. To provide a flat writing surface, writing-support pads **61**A and **61**B blanket crevices **75**A-**75**B between spine **553** and middle cover portions **1842**A and **1842**C, respectively.

When cover **2300** is open 360 degrees, spine **553** is rotatably disposed on middle cover **1842** such that rings **746** of skeleton **550** can rotate about near-ring edge **73** of the flatly-folded cover **2300**. Since spine **553** is riveted to cover **2300**, it is not a pivot about which cover **2300** can rotate. However, when the binder **23** is flatly folded open 360 degrees, the flexibility and small radius of curvature of middle cover **1842** enable spine **553** to be substantially axially disposed relative to the rotation of rings **746** and the oppositely rotating front cover **1144** and back cover **1640**. All points of front cover **1144**, back cover **1640**, and rings **746** rotate through substantially the same size angle about spine **553** as most of the flatly-folded cover **2300** rotates about spine **553**. In this case, front cover **1144** and back cover **1640** share the same angular

rotation about spine **553** even though front cover **1144** and back cover **1640** slide radially in opposite directions relative to spine **553**.

Front cover **1144** comprises front cover portions **1144**A-**1144**B and back cover **1640** comprises back cover portions **1640**A-**1640**B. Front cover portion **1144**B is of reduced thickness enabling the folding of front cover portion **1144**A beneath middle cover **1842** and back cover **1640** as shown in FIG. **3**B. Likewise, back cover portion **1640**B is of reduced thickness enabling the folding of back cover portion **1640**A beneath middle cover **1842** and front cover **1144**.

The binder **23** is similar to the binder **5** in that the thickness of the folded middle cover **1842** is substantially equal to the sum of the thickness of front cover **1144** and back cover **1640** as seen when the binder is open 360 degrees in FIGS. **3**C-**3**E. Moreover, the LSCPL of spine **553** is less than or equal to sum of the thickness of front cover **1144** and back cover **1640** which minimizes or eliminates any potential lump caused by spine **553** when it is positioned between forward loose-leaves **72**A and latter loose-leaves **72**B when the binder **23** is open 360 degrees. Also the major diameter of the rings **746** is much larger than the LSCPL dimension of spine **553**. The many elements of the binder **23** described in detail above work in concert to enable front cover **1144** and forward loose-leaves **72**A to lie flat and parallel to back cover **1640** and latter loose-leaves **72**B when the binder **23** is opened 360 degrees.

As the binder **23** is opened from its closed position to its 360 degree position, front cover **1144** and middle cover portion **1842**A rotate about middle cover portion **1842**B until they abut back cover **1640** and middle cover portion **1842**C, respectively, as shown in FIGS. **3**C-**3**E. Middle cover portion **1842**A, middle cover portion **1842**C, front cover portion **1144**A and back cover portion **1640**A are preferably the same thickness to form parallel planar surfaces when the binder **23** is open 360 degrees.

Partially elliptical rings **746** have a major diameter that is greater than or equal to the sum of their cut-off minor diameter plus the LSCPL of spine **553**. This enables the loose-leaf capacity of rings **746** when the binder **23** is open 360 degrees to be greater than or equal to the capacity of the binder **23** when it is open 180 degrees and is typically loaded.

FIGS. **4**A-**4**C

FIGS. **4**A-**4**C are bottom views of yet another preferred embodiment of a binder **24** of the present invention. The binder **24** comprises skeleton **550**, one or more round rivets **69**, and cover **2400**. Cover **2400** includes front cover **1144**, middle cover **1942**, and back cover **1640**. The binder **24** comprises the same skeleton **550**, front cover **1144** and back cover **1640** as the binder **23** shown in FIGS. **3**A-**3**E, but incorporates a different middle cover **1942** and round rivets **69** in place of middle cover **1842** and staple-thin fasteners **68** of the binder **23**. Skeleton **550** is fixed to middle cover **1942** via round rivets **69**. Middle cover **1942** includes middle cover portions **1942**A-**1942**C. Like middle cover portion **1842**B, middle cover portion **1942**B is of reduced thickness relative to middle cover portions **1942**A and **1942**C. But middle cover portion **1942**B of the binder **24** is longer and thinner than middle cover portion **1842**B of the binder **23** which enables middle cover portion **1942**B to accommodate round rivets **69** as well as staple-thin fasteners **68**. Because middle cover portion **1942**B is thin and flexible, middle cover portion **1942**B prevents round rivets **69** from causing a lump between middle cover portions **1942**A and **1942**C by providing the extra room that round rivets **69** require relative to staple-thin fasteners **68**. Middle cover portion **1942**B is also shaped so as to deter the edges of round rivets **69** from cutting into and damaging middle cover **1942** during repeated usage of the binder **24**. To provide a flat writing surface, writing-support pads **61**A and **61**B blanket crevices **175**A-**175**B between spine **553** and middle cover portions **1942**A and **1942**C, respectively.

FIGS. **5**A-**5**B

FIGS. **5**A-**5**B are bottom views of yet another preferred embodiment of a binder **25** of the present invention. The binder **25** comprises skeleton **550**, one or more round rivets **69**, and cover **2500**. Cover **2500** includes front cover **44**, middle cover **2042**, and back cover **1740**. The binder **25** has the same skeleton **550** as the binder **23** shown in FIGS. **3**A-**3**E. Back cover **1740** has portions **1740**A-**1740**D. Skeleton **550** is fixed to back cover **1740** via round rivets **69**. To facilitate the flipping of front cover **44** and one or more forward loose-leaves **72**A 360 degrees such that they lie parallel to back cover **1740** and latter loose-leaves **72**B, skeleton **550** must be able to incrementally rotate in a stable and controlled manner relative to front cover **44** and back cover **1740**. Because skeleton **550** is riveted to back cover portion **1740**D, it cannot freely rotate relative to back cover portion **1740**D; but skeleton **550** rotates relative to front cover **44** and most of back cover **1740** via a hinge joint **76** between back cover portions **1740**D and **1740**C. Thus rings **746** are rotatable about a near-ring edge of back cover portion **1740**C. Skeleton **550** is not strongly biased to a particular angular position when front cover **44** is flipped 360 degrees beneath back cover **1740**, as illustrated in FIG. **5**B. Skeleton **550** can incrementally rotate as needed depending upon the number of forward loose-leaves **72**A to be flipped beneath back cover **1740**. Spine **553** is substantially axially disposed relative to opposite rotations of large back cover portion **1740**A and rings **46**. Middle cover **2042** has middle cover portions **2042**A-**2042**B and is attached to the wide side of back cover **1740** as divided by hinge joint **76** such that middle cover **2042** does not interfere with the rotation of skeleton **550** as front cover **44** and forward loose-leaves **72**A are flipped beneath back cover portions **1740**A-**1740**C.

Back covers portions **1740**C-**1740**D are of reduced thickness relative to back cover portion **1740**A which aids in providing a flat writing surface when the binder **25** is open 180 degrees by lowering spine **553** partially into the plane of back cover portion **1740**A. Back cover portion **1740**B is a small wedge-shaped segment connecting back cover portion **1740**C with back cover portion **1740**A. To provide a flat writing surface, writing-support pads **61**A and **61**B blanket crevices **275**A-**275**B between spine **553** and back cover portion **1740**A as illustrated in FIG. **5**B. Rivet groove **70** accommodates round rivet **69** when the binder **25** is in its closed position.

The binder **25** is similar to other embodiments of the present invention in that the LSCPL of spine **553** is less than or equal to sum of the thickness of front cover **44** and back cover **1740**A which minimizes or eliminates any potential lump caused by spine **553** when it is positioned between forward loose-leaves **72**A and latter loose-leaves **72**B when binder **25** is open 360 degrees. The binder **25** is also similar to the binder **1** in the manner that its middle cover **2042** is attached to its back cover **1740** to avoid interfering with the rotation of its skeleton **550**.

FIGS. **6**A-**6**C

FIGS. **6**A-**6**B show perspective and side views, respectively, of a further preferred embodiment of a skeleton **450** of the binder of the present invention. FIG. **6**C shows a side cross-sectional view of the rod **452** of skeleton **450**. Skeleton **450** comprises three rings **246** and rod **452**. FIG. **6**C shows that rings **246** comprise ring segments **246**A and ring segments **246**B the ends of which define tabs **47** and slots **48**,

respectively. Also, nubs **49**A and nubs **49**B protrude from ring segments **246**A and ring segments **246**B, respectively. Ring segments **246**A have a small hollow free end into which tabs **47** can be inserted. Skeleton **450** is assembled by inserting ring segments **246**A through holes **57** defined by skeleton **450** and sliding the rings **246** so that only nubs **49**A and not nubs **49**B pass through light-bulb shaped hole **57**. Then each ring **246** is rotated about the portion of ring **246** disposed within hole **57** to stand rings **246** upright relative to rod **452** as shown in FIG. **6**A.

Each ring **246** is opened or closed individually. To open ring **246**, tab **47** is pushed down relative to slot **48** and pulled out of the hollow tip of ring segment **246**A to unhitch tabs **47** from slots **48**. The body of ring **246** acts like a spring which is free of tension or compression in its open position as shown in FIG. **6**B. To close rings **246**, force is exerted to insert tabs **47** of ring segments **246**B into slots **48** of ring segments **246**A until the tabs **47** are hitched in slots **48** and locked therein by the spring loading of rings **246** that exists when rings **246** are in the closed position. Since the front covers of many of the preferred embodiments of the binders of the present invention often rests on the rings of the skeleton, the rotation of the tops of rings **246** towards skeleton **450** can help minimize binder thickness when the binder is closed.

FIGS. **7**A-**7**F

FIG. **7**A is the bottom view of another preferred embodiment of a ring component **546** of the present invention and FIGS. **7**B-**7**F are bottom views of binder **1**, shown in FIGS. **1**A-**1**H, with its skeleton **50** incorporating rings **546** in placed of rings **46**. FIGS. **7**B-**7**F show rings **546** in different positions as varying numbers of forward loose-leaves **72**A are flipped beneath back cover **40**. Ring **546** comprises ring segments **546**A-**546**B and the portion of spine **53** intersected by ring segments **546**A-**546**B.

Ring segment **546**A has ring segments **546**P-**546**R and ring segment **546**B has ring segments **546**S-**546**U. Mostly elliptical ring segments **546**P and **546**S are joined to straight ring segments **546**Q and **546**T, respectively. Straight ring segments **546**Q and **546**T are bridged by straight ring segments **546**R and **546**U to complete rings **546**. Straight ring segments **546**Q, **546**R, **546**U, and **546**T constitute a multiple-line perimeter segment. The two angles that straight ring segments **546**Q and **546**T make with the major axis of the partial ellipse of ring **546** are not arbitrary. Straight ring segments **546**Q and **546**T are made intentionally parallel to lines X**1** and Y**1**, respectively. Line X**1** is a tangent line to spine **53** and ring segment **546**S and line Y**1** is a tangent line to spine **53** and ring segment **546**P. When rings **546** are in their upright position, line X**1** is in the plane of the exterior surface **40**X of back cover **40** and ring segment **546**Q is parallel as shown in FIG. **7**B. Distance A**2** measured from the interior surface **40**N of back cover **40** to the under surface of rings segment **546**Q is the upright-ring loose-leaf capacity of rings **546**. Rings **546** are wider than tall such that the upright-ring loose-leaf capacity of rings **546** is less than or equal to the loose-leaf capacity of rings **546** for the range of spine rotation illustrated in FIGS. **7**B-**7**F. Rings **546** rotate through a smaller angular range in FIGS. **7**B-**7**D than rings **46** rotate in FIGS. **2**B-**2**E. Cover **100** of FIGS. **7**B-**7**F is preferably loaded and unloaded with loose-leaves when cover **100** is open 180 degrees and rings **546** are substantially upright.

FIG. **8**

FIG. **8** is the bottom view of another preferred embodiment of a ring component **646** of the present invention. Rings **646** are very similar to rings **546** but have less straight ring segments and are partially circular.

Ring **646** comprises ring segments **646**A-**646**B and the portion of spine **53** intersected by ring segments **646**A-**646**B. Ring segment **646**A has ring segments **646**P-**646**Q and ring segment **646**B has ring segments **646**R-**646**S. Mostly circular ring segments **646**P and **646**R are joined to straight ring segments **646**Q and **646**S, respectively. Straight ring segments **646**Q and **646**S are parallel with lines X**2** and Y**2**, respectively, and constitute a multiple-line perimeter segment.

Line X**2** is a tangent line to spine **53** and ring segment **646**R and line Y**2** is a tangent line to spine **53** and ring segment **646**P. When rings **646** are in their upright position, line X**2** is horizontal and spine **53** is not beneath the centers of rings **646**, but is biased to one side. During use, rings **646** rotate less because of this bias. Rings **646** are wider than tall to improve loose-leaf capacity of rings **646**.

FIG. **9**

FIG. **9** is the bottom view of another preferred embodiment of a ring component **746** of the present invention. Ring **746** comprises ring segments **746**A-**746**B and the portion of spine **553** intersected by ring segments **746**A-**746**B. Rings **746** are incorporated in binders **23**-**25** shown in FIGS. **3**A-**5**B where the skeleton is fixed to the cover with a fastener or rivet. Rings **746** are wider than they are tall when in the upright position as shown in FIG. **9** to optimize loose-leaf capacity.

FIG. **10**

FIG. **10** is the bottom view of another preferred embodiment of a ring component **846** of the present invention. Ring **846** is very similar to ring **546** except that spine **553** is incorporated in place of spine **53**. Ring **846** comprises ring segments **846**A-**846**B and the portion of spine **553** intersected by ring segments **846**A-**846**B. Ring segments **846**A and **846**B closely correspond in shape and function to ring segments **546**A and **546**B of FIGS. **7**A-**7**F. Rings **846** can be incorporated in binder **25** shown in FIGS. **5**A-**5**B where the skeleton is fixed to back cover **1740**D with a rivet.

The invention provides for a minimal footprint during use without sacrificing other popular advantages common to loose-leaf binders. The binder provides the minimal footprint capability with minimal tearing stress on the loose-leaves, a flat writing surface and the optional ability to simultaneously open or close all rings of the binder via an actuator.

While my above descriptions contain many specificities, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of several preferred embodiments thereof. Many other variations are possible. For example, all binder embodiments with a SOCRA skeleton can instead use a skeleton having independently-openable rings. The cover embodiments with conduits that contain spine **53** can be joined with rings that are not connected by a spine; for example, skeleton **450** could be cut into three segments via cuts between its rings and then each segment placed end-to-end in conduit **56** as when they are unified. Other spineless embodiments are easily created from binders **13**, **14** and **20** by eliminating skeleton **50** and inserting unconnected, independently-openable rings in place of rings **46** of these binders. Skeletons with more rings can be substituted by adding a corresponding number of slots to the binder cover. Skeletons with a synchronized switching element different from those disclosed herein may be substituted. Furthermore, a synchronized switching element that opens or closes all the rings simultaneously can be replaced by a sequential switching element that opens or closes all the rings sequentially. Margin supports can be eliminated especially when writing-support pads are included. Binder **1** can be modified by eliminating its middle cover segment and attaching a wider unsegmented flexible front cover directly to back

cover **40** at the location of seam **66**. Other variants comprise a skeleton with rings that can rotate relative to its spine's longitudinal dimension while a portion of its spine is held still. One such variant comprises a spine with a rectangular cross-section with a height equal to the thickness of its back cover and where the spine rigidly attaches along one edge of the back cover flush with the interior and exterior surfaces of the back cover to extend the back cover writing surface; the spine connects binder rings which can rotate about the spine's longitudinal dimension through slots in the spine. A second such variant can be made simply by placing spine **53** of skeleton **50** in a sleeve with slots corresponding to rings **46** that allow spine **53** to rotate relative to the sleeve; the sleeve which is part of this variant's spine can be rigidly riveted to a cover but still allow spine **53** contained therein and rings **46** to rotate relative to the cover. This use of a fixed sleeve may include the previous variant above where the sleeve is designed with a rectangular cross-section, and having spine **53** of skeleton **50** disposed within and rotatable relative to the rectangular sleeve while the sleeve is held still. Another variant, which lacks a distinct skeleton component, has a cover which is integrally formed with a synchronized switching element for simultaneously opening and closing its rings and which folds flat when open 360 degrees, and has rings that can rotate around a near-ring edge of the flatly-folded cover when the cover is open 360 degrees.

FIGS. **11**A-**11**B

FIGS. **11**A-**11**B show perspective views of a further preferred embodiment of a cover **2700** and its components of the binder of the present invention. Cover **2700**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**H, offers a simplified means of binder assembly relative to cover **100**. Cover **2700** comprises front cover **44**, middle cover **2142**, and back cover **1940**. Middle cover **2142** has middle cover portions **2142**A-**2142**C. Back cover **1940** has back cover portion **1940**A and separable conduit casing **214**. Middle cover portion **2142**C is disposed between middle cover portion **2142**B and back cover portion **1940**A and is thinner than each to form open-groove conduit **656**B. Conduit casing **214** facilitates easy assembly and can be made from various materials including metal, cardboard, and plastic. Conduit casing **214** has a roughly P-shaped cross-section with a substantially planar portion **214**A and a tubular portion **214**B. Planar portion **214**A is affixed upon interior surface of back cover portion **1940**A while part of tubular portion **214**B dips into open-groove conduit **656**B so that conduit casing **214** remains fairly planar with back cover portion **1940**A upon assembly. Tubular portion **214**B of conduit casing **214** defines conduit **656**A. Back cover portion **1940**A has holes **213**A and conduit casing **214** has holes **213**B which are aligned during assembly to receive rivets **69**, which affix conduit casing **214** onto back cover portion **1940**A. Conduit casing **214** has slots **858**L-**858**N. Edge **1940**B of back cover portion **1940**A is straight, but the mounting of conduit casing **214** upon back cover portion **1940**A furnishes back cover **1940** with slots **858**A-**858**C and end slots **858**Y-**858**Z. Middle cover portion **2142**C has fold **2142**D to enable front cover **44** and middle cover **2142** to flip open flatly up against back cover **1940**. Preferably, fold **2142**D is disposed at or adjacent to edge **1940**B of back cover portion **1940**A. Similar to cover **100** of FIGS. **1**A-**1**F, middle cover **2142** joins back cover **1940** between conduit **656**A and far parallel edge **1940**C. With little or no modification, cover **2700** can also incorporate skeletons **50** and **450** of FIGS. **1**G and **6**A, respectively, of the binder of the present invention as well as other skeletons with independently openable rings disclosed herein. Cover **2700** operates essentially the same as cover **100** of FIGS. **1**A-**1**F during usage.

FIGS. **12**A-**12**E

FIGS. **12**A-**12**E show perspective and bottom views of another preferred embodiment of a binder **29**X of the present invention. The binder **29**X is designed to be inexpensive and extra thin when closed, especially suitable as a report binder. The binder **29**X comprises cover **2900** and skeleton **1550**. Cover **2900** comprises back cover **2140**, middle cover **2242**, and front cover **1344** and is preferably made from cardboard or plastic sheet to reduce cost. Skeleton **1550** is an inexpensive single piece of molded PVC plastic. Skeleton **1550** has spine **1153** and rings **1346**. Rings **1346** have ring segments **1346**A-**1346**B, which are attached to spine **1153**. Ring segments **1346**A have ring slots **148** and ring segments **1346**B have tabs **147**. Tabs **147** snugly snap into corresponding reciprocal ring slots **148** forming interlocking closure or snap interlocks **208** to securely close rings **1346**. Each ring **1346** is opened simply by forcefully pulling rings segments **1346**A and **1346**B apart to disengage interlocks **208**. Ring segments **1346**A-**1346**B are U-shaped members each with a square groove along its inside curvature such that ring segments **1346**A-**1346**B also have roughly U-shaped cross-sections, which impart strength to rings **1346** in a similar manner to the purposeful shape of I-beam girders. Importantly, because of the flexible PVC plastic of skeleton **1550**, rings **1346** are opened and closed individually, not concurrently, since spine **1153** twists easily and thus transfers torque ineffectively. Rings **1346** have an oblong oval or elliptical shape when closed. The size of ring **1346** affects the thickness of binder **29**X when closed as evident in FIG. **12**B. Likewise, the size and shape of rings **1346** largely depend upon hole-edge margin **117** of target loose-leaves **72** for use with the binder **29**X. Hole-edge margin **117** of target loose-leaf **72** is the shortest distance between the punched holes and the nearest edge of target loose-leaf **72**. For example, for U.S. binders targeted to hold 3-hole letter-size loose-leaves **72**, the industry standard hole-edge margin **117** is one-quarter inch and for European binders targeted to hold 2-hole or 4-hole A-4 size loose-leaves **72**, the industry standard hole-edge margin **117** is 8 mm. As shown in FIG. **12**D, the major inner diameter of rings **1346** (along the major axis of the elliptical shape of ring **1346**) is greater than twice hole-edge margin **117** of target loose-leaves **72**, but the minor inner diameter of rings **1346** (along the minor axis of the elliptical shape of ring **1346**) is less than twice hole-edge margin **117** but greater than 1 times hole-edge margin **117** of target loose-leaves **72**. The significance of these dimensions relate directly to the ease of page turning when the binder **29**X is open 180 degrees as is implied in FIG. **12**D and to the resulting thickness of cover **2900** when closed about rings **1346** as indicated in FIG. **12**B. The minimum closed-cover thickness of the binder **29**X is limited by the smallest minor inner diameter of rings **1346** that still enables satisfactory page turning. FIG. **12**D and these mathematical inequalities suggest dimensional limits of ring **1346** for satisfactory page turning in relation to hole-edge margin **117** of loose-leaves **72**. Related to these inequalities and experience, preferred rings for extra-thin covers have a ratio of major diameter to minor diameter in the range of 1.75-2.25. FIG. **12**E shows skeleton **1550** as initially molded. When the binder **29**X is assembled, middle cover **2242** and back cover **2140** share conduit casing **414**, which is made of a sheet of flexible foldable material. Back cover **2140** has back cover portion **2140**A and a portion of conduit casing **414** upon assembly. Conduit casing **414** has adhesive attachment strips **216**A to affix conduit casing **414** to its complementary or

remaining bulk portion of cover **2900** upon assembly. Optionally, if the binder **29**X is to be user-assembled, an adhesive strip **216**A on one side of conduit **856** will have a corresponding stick-resistant shield like peel-off ribbon **316**B of FIG. **13**A to become an adhesive closure strip to enable the user to seal close conduit casing **414** about spine **1153**. Back cover **2140** has optional pocket **2140**P. Conduit casing **414** has pocket-spanning gap **118** to allow a broader opening to back cover pocket **2140**P. Upon assembly, cover **2900** defines conduit **856** where spine **1153** of skeleton **1550** is rotatably disposed. Conduit casing **414** has slots **1058**A-**1058**C to accommodate rings **1346**. Cover folds **2242**A and **2140**B border conduit **856**. Two very close roughly 90-degree folds **2242**A and **2140**B add up to one 180-degree cover fold or edge **2242**B when cover **2900** is folded open 360 degrees as exemplified in FIG. **12**C. Folds **2242**A and **2140**B along with the limited rotation of spine **1153** within conduit **856** enable rings **1346** to rotate about edge fold **2140**B of planar back cover portion **2140**A as shown in FIGS. **12**B-**12**C.

FIGS. **13**A-**13**B

FIGS. **13**A-**13**B show bottom views of another preferred embodiment of a binder **30**X of the present invention. The binder **30**X comprises cover **3000** and skeleton **1550**. Consistent with the binder **29**X of FIG. **12**A-**12**E, skeleton **1550** is again preferred because the binder **30**X is also designed to have an extra thin closed cover thickness popular for report binders. Cover **3000**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**H, offers a simplified means of binder assembly relative to cover **100** and is preferably made from one sheet of cardboard or similar material to reduce cost. Cover **3000** comprises front cover **1344**, middle cover **2342**, and back cover **2240**. Middle cover **2342** joins back cover **2240** at fold **2240**B. Back cover **2240** has back cover portion **2240**A and conduit casing **514**. Back cover portion **2240**A comprises two planar bonded layers of the one sheet via permanent fold **2240**C. Conduit casing **514** is integrally formed with and extends from the inner layer of back cover portion **2240**A. A planar portion of conduit casing **514** has adhesive closure strip **316**A and optional stick-resistant peel-off ribbon **316**B. Conduit casing **514** and adhesive closure strip **316**A make up another instant user-sealed wrap-flap closure. Conduit casing **514** has the shape of an acute spiral triangle, which enables back cover **2240** to have a fairly smooth writing surface for loose-leaves **72** as shown in FIG. **13**B. Upon assembly, a wrapping portion of conduit casing **514** defines conduit **956**, where spine **1153** of skeleton **1550** is rotatably disposed. Additionally, with little or no modification, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1550**.

FIGS. **14**A-**14**B

FIGS. **14**A-**14**B show bottom views of another preferred embodiment of a binder **31**X of the present invention. The binder **31**X comprises cover **3100** and skeleton **1550**. Like binder **29**X of FIG. **12**A-**12**E, the binder **31**X employs skeleton **1550** to facilitate its extra thin closed cover thickness popular for report binders. Cover **3100**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**H, offers a simplified means of binder assembly relative to cover **100** and is preferably made from thin sheet material to reduce cost. Cover **3100** comprises front cover **1444**, middle cover **2442**, and back cover **2340**. Front cover **1444** has transparent portion **1444**A attached to opaque portion **1444**B via staples **168**. Middle cover **2442** joins back cover **2340** at fold **2340**B. Back cover **2340** has back cover portion **2340**A and conduit casing **614**. Conduit casing **614** is integrally formed with back cover portion **2340**A to provide the planar interior surface of back cover **2340**. A planar portion of conduit casing **614** has adhesive closure strip **416**A and optional stick-resistant peel-off ribbon **416**B. Conduit casing **614** and adhesive closure strip **416**A make up another instant user-sealed wrap-flap closure. Upon assembly, a wrapping portion of conduit casing **614** defines conduit **1056**, where spine **1153** of skeleton **1550** is rotatably disposed. Additionally, with little or no modification, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1550**.

FIGS. **15**A-**15**B

FIGS. **15**A-**15**B show perspective views of another preferred embodiment of a binder **32**X of the present invention and a sample pocketed folder for its attachment. The binder **32**X comprises cover **3200** and skeleton **1550**. Cover **3200** is a slight variant of cover **600** of the binder **6** of FIGS. **6**A-**6**B. Cover **3200** comprises back cover **2440**, folder-attachment flaps **178**A, and pocket-spanning gap **218**. Back cover **2440** defines conduit **1156** where spine **1153** of skeleton **1550** is rotatably disposed. Back cover **2440** has slots **1158**A-**1158**C to accommodate rings **1346**. Folder attachment flaps **178**A have adhesive attachment strips **516**A and corresponding stick-resistant peel-off ribbons **516**B, which provide an easy means of attaching the binder **32**X to folders, especially a pocket-enhanced folder **3200**F such as shown in FIG. **15**B. Folder **3200**F has pocket **3200**P and recommended attachment areas **178**B for attachment by flaps **178**A. Pocket-spanning gap **218** provides a broader opening to folder pocket **3200**P. Cover **3200** is also a wide universally attachable conduit casing **714**, which along with its skeleton **1550** can transform user-selected complementary cover portions such as assorted folders or singular planar sheet by its mere attachment into a binder without the need of a specialized corresponding reciprocal attachment element such as for a hooks and loops fastener or rivet **69** and hole **213**A attachment of FIG. **11**A-**11**B. Given their functional convenience, flaps **178**A plus adhesive strips **516**A make up an instant user-affixed adhesive attachment. Additionally, with little or no modification to cover **3200**, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1550**.

FIGS. **16**A-**16**E

FIGS. **16**A-**16**E show perspective and bottom views of another preferred embodiment of a binder **33**X of the present invention with both essential and optional components. The binder **33**X comprises cover **3300** and skeleton **1650**. Skeleton **1650** has oblong reversibly compressible rings **1446** threaded by singular rod spine **1253**. Each ring **1446** is a single piece of plastic. Rings **1446** are oval and largely reversibly deformable under typical vertical compressive forces exerted on rings **1446** and binder **33**X during use. An example of such compressive force might be found if binder **33**X is crammed into a crowded briefcase or bookshelf. However, depending upon the precise construction and material properties of ring **1446**, much if not most of the reversible deformation of rings **1446** may occur simply by closing the cover **3300** which can act like a nutcracker to compress rings **1446**. As exemplified by FIGS. **16**C-**16**D, the vertical reversible deformation of rings **1446** facilitates the design of ultra thin, closed cover **3300** that is even thinner than extra thin closed cover **2900** with rings **1346** of FIGS. **12**A-**12**E. Comparing rigid rings **1346** of skeleton **1550** of FIGS. **12**B and **13**B with reversibly compressible rings **1446** of skeleton **1650** of FIGS. **16**C-**16**D indicates that compressible rings **1446** provide improved page turning via the additional clearance afforded compressible rings **1446** for a particular closed cover thickness, especially when loose-leaves **72** are concurrently located above and below respective back covers. Preferably, the maximum reversible deformation or maximum reversible compressibility of ring **1446** in the direction of its minor

diameter is in a range of 15%-50%. Like oblong ring **1346** of FIG. **12**D, the major inner diameter of oblong ring **1446** is greater than twice hole-edge margin **117** of target loose-leaves **72**, but the minor inner diameter of ring **1446** under substantial reversible deformation as shown in FIG. **16**C is less than twice hole-edge margin **117** and the minor inner diameter of ring **1446** when freely expanded as shown in FIG. **16**D is greater than 1 times hole-edge margin **117**. Two different minor inner diameters are used in these mathematical inequalities because the minimum thickness of the closed binder **33**X is achieved when closed cover **3300** and rings **1446** are compressed, but pages of binder **33**X are turned when cover **3300** is open and rings **1446** are freely expanded. The minor inner diameter under reversible deformation is compared to be less than twice hole-edge margin **117** because this condition is related to the objective of constructing a thin cover and distinguishes ring **1446** from conventional circular rings, but the minor inner diameter of the freely expanded ring is compared to be greater than one times hole-edge margin **117** because this condition is related to satisfactory page turning. Accordingly, the reversibly deformable rings **1446** facilitate easy page turning implied in FIG. **16**D and facilitate the construction of ultra thin cover **3300** as indicated by FIG. **16**C. When upright as shown in FIGS. **16**A-**16**B, rings **1446** have column-like roughly vertical thick ring portions **1446**P-**1446**Q that taper to roughly horizontal thin bow-like ring portions **1446**R-**1446**S to facilitate reversible deformation. The relatively thicker column-like vertical ring portions **1446**P-**1446**Q resist permanent buckling under typical vertical compressive forces while the relatively horizontal thin bow-like ring portions **1446**R-**1446**S easily flatten under these same vertical compressive forces and spring back upon their removal to provide the majority of the desired reversible deformation as shown in FIGS. **16**C-**16**D. Ring **1446** has tab **247** and corresponding slot **248**, which snap fit together forming interlock **308** to securely close ring **1446**. Ring **1446** has neck **1446**N adjacent tab **247**. Neck **1446**N can be lengthened to make interlock **308** into a telescopic linkage, which increases the range or extent of reversible deformation that ring **1446** can undergo. Interlock **308** is suitably located on vertical ring portion **1446**Q where vertical compressive force tends to reinforce ring closure, but this location also enables horizontal portion **1446**R to be thinner and more elastic than otherwise to facilitate reversible deformation. Ring **1446** has thread hole **157** for threading ring **1446** on rod spine **1253**. Spine **1253** is a type of orthogonal base for ring **1446** to facilitate pivoting; alternatively, if spine **1253** is replaced by a wider orthogonal base with rivet holes, rings **1446** can be attached to a cover in a fixed conventional manner that prohibits pivoting but still facilitates the design of an ultra thin binder cover. In a preferred manufacturing method, rings **1446** are extruded as a plastic shaft with a roughly C-shaped cross-section, which is sliced into roughly C-shaped open rings whose two free ends are then punch-cut into opposing tabs **247** and slots **248**. Cover **3300**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**H, offers a simplified means of binder assembly relative to cover **100** and is preferably made from thin sheet material to reduce cost. Cover **3300** comprises front cover **1344**, middle cover **2542**, and back cover **2540**. Middle cover **2542** borders edge-fold **2540**B to enable front cover **1344** and middle cover **2542** to fold flatly open 360 degrees up against back cover **2540** as shown in FIG. **16**D. Back cover **2540** has back cover portion **2540**A and attached conduit casing **814**. Conduit casing **814** has a roughly P-shaped cross-section and is preferably made of a fairly flexible material. Conduit casing **814** has tubular portion **814**B, which defines conduit **1256** where spine **1253** of skeleton **1650** is rotatably disposed. Conduit casing **814** has slots **1258**A-**1258**C to accommodate rings **1446**. Additionally, with little modification to cover **3300** beyond increasing its closed cover thickness, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1650**. Notably, conduit casing **814** is attached to back cover portion **2540**A near edge **814**A, which enables the opposite free tubular portion **814**B to be lifted by middle cover **2542** when cover **3300** is closed as shown in FIG. **16**C and which enables tubular portion **814**B to dangle or droop around edge-fold **2540**B when cover **3300** is folded open 360 degrees in a flat formation as shown in FIG. **16**D. Tubular portion **814**B becomes substantially flush with back cover **2540** and middle cover **2542** of the flat formation of cover **3300** shown in FIG. **16**D. Conduit casing **814** is attached to back cover portion **2540**A via optional adhesive attachment strip **616**A. Conduit casing **814** is preferably attached to back cover portion **2540**A via plastic weld or fusing when using plastic or adhesive when using other materials. By incorporating a instant user-affixed attachment such as adhesive attachment strips **616**A coordinated with corresponding stick-resistant peel-off ribbons **516**B of FIG. **15**A, conduit casing **814** can also be produced for sale as a standalone product for subsequent attachment by users to folders **3200**F of FIG. **15**B. A instant user-affixed attachment is alternatively aptly called an assembly-deferred after-sale attachment. Deferring assembly provides users with coveted consumer choice, allowing users to select the complementary cover portion to which conduit casing **814** and rings **1446** are to be attached. Conduit casing **814** has optional pocket-spanning gap **318** for use with pocket-enhanced folders **3200**F of FIG. **15**B. The binder **33**X operates similar to the binder **1** of FIGS. **1**A-**1**H, but its rings **1446** are opened and closed individually and its ultra thin closed cover **3300** uses less space during packing, storage, and transport.

FIG. **16**E shows another preferred embodiment of a conduit casing **914**, attached to back cover portion **2540**A, for use with cover **3300** and other covers disclosed herein. Conduit casing **914** is made of a resilient semi-rigid material. Conduit casing **914** defines conduit **1356** and has longitudinal opening or aperture **204** with which to receive spine **1253** and other spines disclosed herein. Conduit **1356** receives spine **1253** via snap-insert action where aperture **204** temporarily expands during forced insertion of spine **1253**. Conduit casing **914** and resiliently expandable aperture **204** make up a resilient snap-in clasp closure, which is also another type of instant pivot fastening. After insertion, the semi-rigid conduit casing **914** is firm enough to retain and support spine **1253** during normal usage. Conduit casing portion **914**B is reduced in thickness for increased flexibility to act like a hinge between the majority of conduit casing **914** and back cover **2540** to enable spine insertion and to function similar to conduit casing **814** as shown in FIGS. **16**C-**16**D.

FIGS. **17**A-**17**K

FIGS. **17**A-**17**K show perspective and bottom views of another preferred embodiment of a binder **34**X of the present invention with both essential and optional components. The binder **34**X comprises cover **3400** and the skeleton **1750**. Consistent with the binder **33**X of FIG. **16**A-**16**D, the binder **34**X employs a skeleton **1750** having reversibly compressible rings **1546** to facilitate the ultra thin closed cover thickness of the binder **34**X popular for report binders. Cover **3400** is a slight variant of ultra thin cover **3300** of FIGS. **16**A-**16**D. Like cover **3300**, cover **3400** comprises the same back cover **2540**, but includes different middle cover **2642** and front cover **1544**. Middle cover **2642** and front cover **1544** join at primary cover fold **1544**A and are bowed about rings **1546** of skeleton

1750 when cover 3400 is closed as in FIG. 17A in an aesthetically pleasing streamline contour. Also, like cover 3300, middle cover 2642 joins back cover 2540 at edge-fold 2540B. Notably, tubular portion 814B of conduit casing 814 is lifted by middle cover 2642 when cover 3400 is closed as shown in FIG. 17A and dangles or droops around edge-fold 2540B when cover 3400 is folded open 360 degrees in a flat formation as shown in FIG. 17D. Tubular portion 814B becomes substantially flush with back cover 2540 and middle cover 2642 of the flat formation of cover 3400. Spine 1353 of skeleton 1750 is rotatably disposed in conduit casing 814 of back cover 2540 as a pivot about which cover 3400 is rotatable.

FIG. 17B shows a perspective view of optional ring-crush resister 119 for use with cover 3400. FIGS. 17C-17D show bottom views of cover 3401. Cover 3401 comprises cover 3400 plus ring-crush resister 119. Ring-crush resister 119 has four sections divided by three parallel hinge-like folds. Two sections of ring-crush resister 119 are attachment flaps 119A-119B and the other two sections are ring-crush resister portions 119C-119D. Attachment flaps 119A and 119B are attached to front cover 1544 and middle cover 2642, respectively, preferably via plastic weld or adhesive to form tetragonal tube 119T. Although tetragonal tube 119T has roughly a tetragon cross-section, two sides of tube 119T are tensilely straightened when cover 3401 is closed under sufficient vertical compressive force such that tube 119T supports cover 3401 in the manner of a triangular truss as shown in FIG. 17C to oppose excessive deformation of rings 1546. These two straightened sides are ring-crush resister portion 119C and the portion of front cover 1544 that coincides with a portion of tetragonal tube 119T. When tube 119T assumes its roughly triangular shape of FIG. 17C, it shares loading of compressive force exerted on cover 3401 with rings 1546. Tube 119T serves to prevent or inhibit permanent deformation of rings 1546 that may result from excessive compressive force exerted on closed cover 3401 roughly in the direction of the minor axis of rings 1546. Permanent deformation may include creases in rings 1546 which degrade the page-turning suitability of rings 1546. Note, ring-crush resister portion 119D is appropriately thick and rigid whereas ring-crush resister portion 119C can be thinner and more flexible because ring-crush resister portion 119D is under compression and ring-crush resister portion 119C is under tension when sufficient compressive force is exerted on closed cover 3401 roughly in the direction of the minor axis of rings 1546. When cover 3400 is open 180 degrees or 360 degrees, tetragonal tube 119T folds flatly as shown in FIG. 17D to enable loose-leaves 72 to lie fairly flatly against front cover 1544 and middle cover 2642. Ring-crush resister 119 has slots 1358T-1358V to accommodate rings 1546 when tube 119T is erect as when cover 3401 is closed. Slots 1358T-1358V are preferably funnel-shaped to guide rings 1546 into slots 1358T-1358V as cover 3401 is closed. Preferably, slots 1358T-1358V fit snugly about rings 1546 to inhibit the pitch lean or tilt of rings 1546 towards the longitudinal axis of spine 1353 when compressive force is exerted on rings 1546 in the direction of the minor axis of rings 1546.

FIG. 17E shows a bottom views of optional tubular ring-crush resister 219 for use with cover 3400. FIG. 17F shows a bottom view of cover 3402. Cover 3402 comprises cover 3400 plus tubular ring-crush resister 219. Tubular ring-crush resister 219 has adhesive attachment strip 219A spread across fold 219B. Ring-crush resister 219 is adhesively attached to cover 3400 such that fold 219B coincides with cover fold 1544A. Similar to tetragonal tube 119T of FIGS. 17C-17D, tubular ring-crush resister 219 has a roughly tetragonal cross-section, but two sides of ring-crush resister 219 are tensilely straightened, when closed cover 3402 is under sufficient compressive force, such that ring-crush resister 219 supports cover 3402 in the manner of a triangular truss as shown in FIG. 17F for the same functional reasons that tube 119T supports cover 3401 in FIG. 17C. Tubular ring-crush resister 219 has four side portions divided by four hinge-like folds and is made of a single sheet of material. Ring-crush resister portion 219D is made thicker and more rigid by overlapping and bonding several layers of the sheet of material together to better withstand compression during use. Ring-crush resister 219 has slots similar to slots 1358T-1358V of ring-crush resister 119. When cover 3402 is open 180 degrees or 360 degrees, ring-crush resister 219 is folded flat as shown in FIG. 17E similar to tube 119T of FIG. 17D.

FIG. 17G shows a bottom view of conduit casing 1014 in which skeleton 1750 is retained. Conduit casing 1014 is integrally formed with roof-like or arch ring-crush resister 319. FIGS. 17H-17I show bottom views of cover 3403 joined to skeleton 1750. Cover 3403 is similar to cover 3400 of FIG. 17A, but substitutes conduit casing 1014 in place of conduit casing 814. Cover 3403 comprises front cover 1544, middle cover 2642, back cover portion 2540A, and conduit casing 1014. Conduit casing 1014 is attached to back cover portion 2540A near hinge-like portion 1014A. Conduit casing 1014 defines conduit 1456 where spine 1353 of skeleton 1750 is rotatably disposed. Conduit casing 1014 has longitudinal opening 304 with which to receive spine 1353 during assembly. Conduit casing 1014 has spring arm 1014B, which lifts skeleton 1750 relative to arch ring-crush resister 319 as shown in FIG. 17G to provide extra page-turning clearance over arch ring-crush resister 319 when cover 3403 is open. When cover 3403 is closed under sufficient compressive force, cover 3403 compresses rings 1546, which in turn push spring arms 1014B down against middle cover 2642. When the height of any of the compressed rings 1546 as measured along their minor axes is the same as the height of arch ring-crush resister 319 as shown in FIG. 17H, arch ring-crush resister 319 shares loading of the compressive force with rings 1546 to prevent or inhibit permanent deformation of rings 1546. When cover 3403 is folded flatly open 360 degrees, hinge-like portion 1014A enables conduit casing 1014 to dangle or droop down around edge-fold 2540B where it is fairly flush with the flat formation of cover 3403. Middle cover 2642 lifts conduit casing 1014 upright when cover 3403 is closed.

FIG. 17J shows a bottom view of cover 3404. Cover 3404 comprises cover 3400 plus ring-crush resister 419. Ring-crush resister 419 includes ridges 419A-419B, which are attached to cover 3400 immediately adjacent fold 1544A. The close proximity of ridges 419A-419B to fold 1544A prevents fold 1544A from being sharp and narrow. The well-rounded fold 1544A limits very narrow closure of cover 3404 about rings 1546 when skeleton 1750 is added, which inhibits permanent deformation of rings 1546.

FIG. 17K shows a perspective view of another preferred embodiment of a skeleton 1750 of the binder of the present invention. Skeleton 1750 is a single piece of molded plastic. Skeleton 1750 has a thin cylindrical spine 1353, which attaches to each of a plurality of binder rings 1546. Rings 1546 comprise rings segments 1546A-1546B and the portion of spine 1353 they intersect. Notably, the cross-sectional diameter of spine 1353 is approximately equal to the prong thickness of ring segment 1546A where they intersect. Rings 1546 are shaped similar to rings 1446 of FIGS. 16A-16D for the same functional reasons described for rings 1446 related to compressibility and page-turning. Both have bow-like

roughly horizontal thin portions and column-like roughly vertical thick portions when they are closed and upright. Rings **1546** have tabs **147** and slots **148**, which snap fit together to form interlock **208**. Additionally, rings **1546** have butterfly-shaped or bowtie-shaped flip-top hinge **120** which functions to enable rings **1546** to flip open similar to well-known plastic flip-top caps of plastic tubes and bottles popular for packaging cream, gel, and liquid products.

With little or no modification to cover **3400**, skeleton **1650** of FIG. **16**A and others disclosed herein can be substituted for skeleton **1750**. The binder **34**X operates similar to the binder **33**X of FIGS. **16**A-**16**D.

FIG. **18**

FIG. **18** shows a perspective view of another preferred embodiment of a ring **2146** of the binder of the present invention positioned upright with its minor dimension or minor diameter oriented vertically. Oblong ring **2146** intersects fulcrum **122**. A set of oblong rings **2146**, each with an individual fulcrum acting as an axial portion for pivoting, is another type of pivot binding. Fulcrum **122** is also a type of orthogonal base. Oblong ring **2146** is has a roughly rectangular shape with a major diameter and a minor diameter comparable to corresponding diameters of ring **1346** of FIG. **12**D for the same functional reasons. Ring **2146** incorporates elastic spiral closure **508**. Ring **2146** is inexpensively made from flat sheet plastic of uniform thickness. As a typical use example, fulcrum **122** can be rotatably disposed in conduit **856** of cover **2900** of FIG. **12**A or, alternatively, fulcrum **122** can be stapled along a fold of a cover in similar manner to the attachment of skeleton **550** to cover **2300** of FIGS. **3**A-**3**E.

FIGS. **19**A-**19**B

FIG. **19**A shows a perspective view of another preferred embodiment of a binder **35**X of the present invention with both essential and optional components. The binder **35**X is a slight variation of the binder **34**X, especially the version of binder **34**X depicted in FIGS. **17**G-**17**I in which the conduit casing **1014** is able to perform all the required pivot motion of rings **1546** about edge-fold **2540**B whether or not spine **1353** is rotatable relative to conduit casing **1014** or fused rigidly to it. The binder of **35**X represents an improvement over the binder of **34**X by simply fusing separate parts to reduce manufacturing costs and to minimize the amount of material used while retaining the essential design of the ultra-thin cover **3400**. This functionally similar binder is created by fusing a spine or a portion of a ring intersecting a spine with a conduit casing and using the flexibility of the conduit casing to provide a combination of cantilever pivot action and/or elastic hinge action as demonstrated by conduit casing **814** of FIG. **17**A as well as conduit casing **1014** of FIGS. **17**G-**17**I. Skeleton **1850** is an example of such fusing. The binder **35**X comprises cover **3500** and the skeleton **1850**. Like the binder **34**X of FIG. **17**A, the binder **35**X employs a skeleton **1850** having reversibly compressible rings **2246** to facilitate the ultra thin closed cover thickness of the binder **35**X popular for report binders. Skeleton **1850** is a single piece of molded plastic comprising flat spine **1453**, elastic pivot **222**, and rings **2246**. Ring **2246** comprises ring segments **2246**A-**2246**C, flip-top hinge **120**, and tab-slot interlock **208**. As shown in FIGS. **17**I-**17**K, tab-slot interlock **208** comprises tab **147** and slot **148**; tab **147** is inserted flush within slot **148** so as not to substantially protrude beyond the perimeter of ring **2246** to avoid obstructing ring-bound loose-leaves from sliding along the ring perimeter. Spine **1453** is a flat orthogonal base to which each ring **2246** is attached by an elastic pivot **222**. Elastic pivot **222** comprises elastic hinge **222**A and fulcrum **222**B. Fulcrum **222**B contributes to the rotation of rings **2246** about edge-fold **2640** via cantilever bending. Notably, fulcrum **222**B is joined to the bottom ring segment **2246**A via elastic-hinge **222**A near the side of ring **2246** that is adjacent edge-fold **2640**A. This side-biased attachment reduces the amount of rotation required of rings **2246** when some ring-bound loose-leaves are flipped 360 degrees about edge-fold **2640**A. Pivot **222** is roughly axially disposed relative to opposite rotations of back cover **2640** and rings **2246**. Binder **35**X uses a different ring-cover attachment arrangement than binder **34**X. Unlike skeleton **1750**, which is rotatably attached to cover **3400**, having spine **1353** rotatably disposed in conduit casing **814** as a pivot about which cover **3400** is rotatable as shown in FIG. **17**A, skeleton **1850** is firmly affixed to cover **3500** by adhesive attachment strip **716**A or alternative fastening means such as rivets or plastic weld as shown in FIG. **19**A. Cover **3500** comprises back cover **2640**, middle cover **2742**, front cover **1644**, and ring-crush resisters **519**. Middle cover **2742** and front cover **1644** join at primary cover fold **1644**A and are bowed about rings **2246** of skeleton **1850** when cover **3500** is closed in an aesthetically pleasing mostly streamline contour similar to cover **3400** shown in FIG. **17**A. Ring-crush resisters **519** intersect primary fold **1644**A; each ring-crush resister **519** is located adjacent to at least one of rings **2246** to oppose excessive deformation of rings **2246** by extreme compressive force potentially applied to cover **3500** while it is closed. Although the contour of closed cover **3500** is mostly streamline, the contour of a bottom sectional view of closed cover **3500** along a cut that bisects ring-crush resister **519** is similar to the contour of closed cover **3300** shown in FIG. **16**C. Middle cover **2742** joins back cover **2640** at edge-fold **2640**A under fulcrums **222**B of skeleton **1850**. Fulcrum **222**B provides a cantilever bending action and elastic hinge **222**A provides a hinge action that enables rings **2246** to tilt or pivot about edge-fold **2640**A of cover **3500** in a similar manner as the pivoting of spine **1353** and drooping of tubular portion **814**B of conduit casing **814** around edge-fold **2540**B to enable rings **1546** to pivot about edge-fold **2540**B of cover **3400** (This cantilever bending action and elastic hinge action is also imitated by conduit casing **1014** of FIGS. **17**G-**17**I). Rings **2246** are lifted to their upright position by middle cover **2742** when cover **3500** rests closed on a horizontal surface.

Each ring crush resister **519** is formed by interrupting and splitting 180-degree primary fold **1644**A into two separate 90-degree folds that surround a small area of cover **3500** and that then rejoin together again to continue primary fold **1644**A. The small surrounded area is preferably formed as a streamline symmetrical shape such as an elongated oval or rounded-corner rhombus for aesthetic reasons. When cover **3500** is closed, the small areas of each ring-crush resister **519** are roughly perpendicular to front cover **1644** and middle cover **2742** and are physical obstacles that prevent the adjacent interior surfaces of front cover **1644** from contacting the adjacent interior surfaces of middle cover **2742** and thus help to oppose excessive deformation of adjacent rings **2246** by cover **3500** if cover **3500** is subjected to large compressive forces exerted in the direction of the minor axis of rings **2246**.

The binder **35**X operates similar to the binder **34**X of FIGS. **17**A-**17**K. Additionally, adhesive attachment strip **716**A can be coordinated with peel-off ribbons to allow skeleton **1850** to be produced or further modified for sale as standalone products similar to those of FIGS. **15**A and **16**A for subsequent attachment by users to folders **3200**F of FIG. **15**B.

FIG. **19**B shows a bottom view of ring **2246**. Ring **2246** has protruding paper-catch ring-edge **123**. Ring-edge **123** protrudes only slightly so as not to interfere with page turning, yet protrudes enough to hook or catch loose-leaves when cover **3500** is closed and binder **35**X is dropped into a hanging

file folder rings-side first. By catching loose-leaves, ring-edge **123** obstructs ring-bound loose-leaves from sliding between rings **2246** and front cover **1644**, an event that thickens the closed cover **3500** causing it to take up more space in the hanging file folder. Additionally, side ring segment **2246**C joins bottom ring segment **2246**A at roughly a right angle, but preferably at a slightly obtuse angle so as to bias or slant ring-bound loose-leaves toward spine **1453** when cover **3500** is closed and is dropped into a hanging file folder rings-side first. Thus ring-edge **123** and the slant of ring segment **2246**C contribute to keeping binder **35**X ultra-thin whether dropped into a hanging file folder rings first or rings last.

FIG. **20**

FIG. **20** shows a perspective view of another preferred embodiment of a skeleton **1950** of the present invention. Skeleton **1950** is very similar to Skeleton **1850** of FIGS. **19**A-**19**B except rings **2246** are more closely attached to spine **1453** via elastic-hinge **222**A.

FIGS. **21**A-**21**B

FIGS. **21**A-**21**B show bottom views of another preferred embodiment of a ring **2346** of the binder of the present invention. FIG. **21**A shows ring **2346** positioned upright with its minor dimension or minor diameter oriented vertically and its corresponding perpendicular major dimension oriented horizontally. Oblong ring **2346** has a roughly bullet shape and comprises ring segments **2346**A-**2346**C. Ring **2346** intersects spine **1353**, has strip hinge **220**, and is securely closed by tab-slot interlock **208**. Ring segments **2346**A and **2346**C are pulled apart to elastically open ring **2346** within the same geometric plane that ring **2346** occupied when closed. Preferably, spine **1353** is fused with a plurality of oblong rings **2346** as a single piece of molded plastic. Notably, pivot spine **1353** intersects bottom ring segment **2346**A near side ring segment **2346**C similar to how fulcrum **222**B is attached to the bottom ring segment **2246**A near the side ring segment **2246**C in FIG. **19**B. This side-biased attachment reduces the amount of rotation required of rings **2346** when some ring-bound loose-leaves **72** are flipped 360 degrees from one side of conduit casing **814** to the other as shown in FIG. **21**B. Notably, rings **2346** need only rotate a small amount to accommodate loose-leaves positioned below conduit casing **814** as compared to the rotation of rings **1346** of binder **29**X as suggested in FIGS. **12**B-**12**C. Ring **2346** has slightly protruding ring-edge **123** and ring side segment **2346**C is attached to bottom ring segment **2346**A preferably at a slight obtuse angle for the same reasons as described for ring **2246** of FIGS. **19**A-**19**B.

While my above descriptions contain many specificities, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of several preferred embodiments thereof. Many other variations are possible. For example, reversibly compressible rings can be attached to wide fixed-attachment spines and still facilitate the design of ultra thin covers. Likewise, specific ring-crush resisters disclosed herein can be incorporated in ultra thin covers of binders with fixed-attachment spines.

Another preferred embodiment fuses flat spine **1453** of FIGS. **19**A-**19**B into back cover **2640** via plastic molding with fulcrum **222**B extending from back cover **2640** over edge-fold **2640**A and separate from middle cover **2742**.

It will be appreciated by persons skilled in the art that herein described is a loose-leaf binder and analogous products and method of use. While the present invention has been described by reference to various preferred embodiments, it will be understood by persons skilled in the art that many modifications and variations may be made in those preferred embodiments without departing from the spirit and scope of the present invention. Accordingly, it is intended that the invention not be limited to the disclosed preferred embodiments and that it have the full scope permitted by the following claims.

I claim:

1. A loose-leaf binder comprising:

a cover having a front cover and a back cover;

a plurality of oblong binder rings that are each closable from an open position via an interlock closure;

a connective element having at least one pivot means for pivoting said oblong binder rings about a main axis of rotation;

said connective element joining together and aligning said oblong binder rings along said main axis of rotation,

at least one of said oblong binder rings elastically closable from an open position while continually remaining within a single geometric plane,

each of said oblong binder rings has a major diameter and a minor diameter, said main axis of rotation is perpendicular to each of said oblong binder rings and is located adjacent one side of each of said oblong binder rings as divided by said minor diameter,

said minor diameter defining an upright ring position when said minor diameter is substantially vertical and said main axis of rotation is located below said major diameter,

said major diameter being substantially parallel to said front cover and said back cover when said cover is closed,

said pivot means perpendicularly joining said connective element to at least a ring one of said oblong binder rings adjacent one side of a bottom portion thereof enabling said ring one to stand upright when said pivot means is horizontal,

said cover enwraps and shields most of the perimeter of each of said oblong binder rings when said cover is closed such that each of 270 rays emanating from the center of a first ring of said oblong binder rings and spaced at consecutive 1-degree angular increments and intersecting the perimeter of said first ring subsequently intersects said cover when said cover is closed,

said cover is folded in a substantially flat formation with a near-ring edge adjacent said oblong binder rings when said cover is open 360 degrees,

a portion of each of said oblong binder rings rotatable about said near-ring edge,

said main axis of rotation is roughly axially disposed relative to opposing rotations of said cover and said ring one while said ring one remains closed,

said connective element affixed flush with or flatly to said flat formation of said cover to provide a sufficiently smooth surface for writing on any ring-bound loose-leaves stacked thereon, and said connective element remaining flush or flat relative to said flat formation when said portion of each of said oblong binder rings rotate about said near-ring edge,

whereby arrangement of said pivot means with said oblong binder rings facilitates limited rotational attachment of said oblong binder rings to said cover, enables said cover to be extra thin when closed thus saving storage space, enables nimble page-turning of ring-bound loose-leaves when said cover is open 180 degrees, and reduces the amount of necessary rotation of said oblong binder rings when ring-bound loose-leaves are stack substantially flat above and below said pivot means when said cover is open 360 degrees.

2. The binder of claim 1 wherein said pivot means comprises an elastic pivot and a flat orthogonal base; said elastic pivot disposed between said flat orthogonal base and said ring one, said flat orthogonal base disposed adjacent said near-ring edge of said cover.

3. The binder of claim 1 wherein said cover has a conduit, said pivot means comprises a spine and said conduit, said spine is rotatably disposed in said conduit as a pivot about which said cover is rotatable, said conduit is disposed adjacent to said near-ring edge.

4. The binder of claim 1 wherein said pivot means comprises an elastic pivot, and wherein said cover, said connective element, and said plurality of oblong rings are formed of a single piece of molded plastic such that said connective element is fused with said cover and said plurality of oblong rings extending from said cover via at least one said elastic pivot.

5. The binder of claim 1 wherein at least one of said oblong binder rings has a protruding paper-catch ring-edge.

6. The binder of claim 1 wherein at least one of said oblong binder rings has a flip-top hinge.

7. The binder of claim 1 wherein

each of said oblong binder rings has roughly-vertical column-like stiff portions when situated in said upright ring position;

each of said oblong binder rings has a roughly-horizontal bow-like flexible upper portion when situated in said upright ring position;

each of said oblong binder rings has a roughly-horizontal lower portion when situated in said upright ring position;

each of said oblong binder rings is reversibly compressible relative to a moderate compressive force roughly exerted in the direction of said minor diameter such that said column-like stiff portions resist permanent buckling while said bow-like flexible upper portions more readily flatten and widen outward to provide much of desired reversible vertical compressibility,

each of said oblong binder rings springs back to resume a relaxed expanded form upon removal of said moderate compressive force.

8. A binder for releasably binding a plurality of loose-leaves comprising:

a cover comprising a back cover, a middle cover, and a front cover;

a plurality of oblong binder rings that are each elastically closable from an open position via an interlock closure;

at least one elastic pivot;

at least one flat orthogonal base;

each of said oblong binder rings has a major diameter and a minor diameter,

said minor diameter defining an upright ring position when said minor diameter is substantially vertical,

said major diameter being substantially parallel to said front cover and said back cover when said cover is closed,

said cover has an inner surface and outer surface when closed,

said flat orthogonal base affixed flatly to said inner surface of said cover,

said flat orthogonal base attached to at least a ring one of said oblong binder rings via said elastic pivot enabling said ring one to stand upright when said flat orthogonal base is horizontal,

said middle cover joins said back cover to said front cover,

said back cover separated from said middle cover by an edge-fold,

said flat orthogonal base and said ring one straddle said edge-fold,

said middle cover supporting said ring one when said middle cover is extended flatly away from said back cover on a flat surface,

said cover enwraps and shields most of the perimeter of each of said oblong binder rings when said cover is closed such that each of 270 rays emanating from the center of a first ring of said oblong binder rings and spaced at consecutive 1-degree angular increments and intersecting the perimeter of said first ring subsequently intersects said cover when said cover is closed,

said cover is folded in a flat formation with said edge-fold adjacent said oblong binder rings when said cover is open 360 degrees,

a portion of each of said oblong binder rings rotatable about said edge-fold when said cover is open 360 degrees.

9. The binder of claim 8 wherein said back cover, said middle cover, and said front cover are made of the same material.

10. The binder of claim 8 wherein said flat orthogonal base, said elastic pivot and said plurality of oblong binder rings are together a single piece of molded plastic.

11. The binder of claim 8 wherein at least one of said oblong binder rings has a protruding paper-catch ring-edge.

12. A loose-leaf binder comprising:

a plurality of binder rings;

a cover comprising a front cover, a back cover, a primary fold, and at least one fold-intersecting ring-crush resister;

said primary fold located between said front cover and said back cover when said cover is extended flatly open 180 degrees,

said primary fold dividing into two folds that border opposite sides of an area of said cover to define said fold-intersecting ring-crush resister,

said fold-intersecting ring crush resister disposed adjacent to at least a ring one of said binder rings,

said fold-intersecting ring-crush resister is roughly perpendicular to said front cover and said back cover when said cover is folded closed along said primary fold,

whereby said fold-intersecting ring-crush resister acts as a physical obstacle to oppose excessive deformation of adjacent said ring one caused by large compressive forces exerted on exterior surfaces of said cover when said cover is closed.

13. The binder of claim 12 wherein each of said binder rings has an oblong perimeter having a major diameter and a minor diameter, said primary cover fold comprises a pair of very close folds effectively acting as one fold, distance between said pair of very close folds less than half of said minor diameter, maximum distance between said two folds that border opposite sides of said area of said cover greater than half of said minor diameter.

14. The binder of claim 12 wherein

each of said binder rings is an oblong binder ring having a major diameter and a minor diameter,

said minor diameter defining an upright ring position when said minor diameter is substantially vertical,

each of said binder rings has roughly-vertical column-like stiff portions when situated in said upright ring position;

each of said binder rings has a roughly-horizontal bow-like flexible upper portion when situated in said upright ring position;

each of said binder rings has a roughly-horizontal lower portion when situated in said upright ring position;

each of said binder rings is reversibly compressible relative to a moderate compressive force roughly exerted in the direction of said minor diameter such that said column-like stiff portions resist permanent buckling while said bow-like flexible upper portions more readily flatten and widen outward to provide much of desired reversible vertical compressibility,

each of said binder rings springs back to resume a relaxed expanded form upon removal of said moderate compressive force.

15. The binder of claim **12** further comprising:

at least one elastic pivot;

at least one flat orthogonal base;

each of said binder rings has an oblong perimeter having a major diameter and a minor diameter,

said minor diameter defining an upright ring position when said minor diameter is substantially vertical,

said cover has an inner surface and outer surface when closed,

said flat orthogonal base affixed flatly to said inner surface of said cover,

said flat orthogonal base attached to at least a ring one of said binder rings via said elastic pivot enabling said ring one to stand upright when said flat orthogonal base is horizontal,

said cover is folded in a flat formation with a near-ring edge adjacent said binder rings when said cover is open 360 degrees,

a portion of each of said binder rings rotatable about said near-ring edge while said flat formation remains flat.

16. The binder of claim **12** further comprising:

at least one pivot;

said cover having a conduit,

at least a ring one of said binder rings attached to said pivot,

said pivot disposed in said conduit to rotatably attach said ring one to said cover,

each of said binder rings has an oblong perimeter,

said cover is foldable in a flat formation with a near-ring edge adjacent said binder rings when said cover is open 360 degrees,

a portion of each of said binder rings rotatable about said near-ring edge while said flat formation remains flat.

17. A binder for releasably binding a plurality of loose-leaves comprising:

a skeleton having a spine and a plurality of oblong binder rings;

an instant user-affixed adhesive attachment for attaching said spine to a surface;

said skeleton is a single piece of molded plastic,

each of said oblong binder rings has an interlock closure and is closable from an open position,

each of said oblong binder rings has a major diameter, a minor diameter and a ring perimeter when closed,

said interlock closure comprises a tab and a slot,

said tab fits substantially flush within said slot so as not to protrude substantially beyond said ring perimeter enabling ring-bound loose-leaves to slide along said ring perimeter unobstructed by said tab and said slot,

said spine has a substantially planar portion,

said planar portion has said instant user-affixed adhesive attachment,

said minor diameter defining an upright ring position when said minor diameter is substantially vertical,

said spine perpendicularly attached to each of said oblong binder rings allowing each of said oblong binder rings to stand upright when said planar portion of said spine is horizontal,

whereby said instant user-affixed adhesive attachment offers ready, quick and easy mounting of said skeleton upon a user-selected complementary cover such as a file folder, special shape of said oblong binder rings facilitates attachment thereof to said complementary cover that is extra thin to save storage space while preserving nimble page-turning of ring-bound loose-leaves when said complementary cover is open 180 degrees, and flush fitting of said tab and said slot eases ring closure and improves said oblong binder ring appearance

each of said oblong binder rings has roughly-vertical column-like stiff portions when situated in said upright ring position;

each of said oblong binder rings has a roughly-horizontal bow-like flexible upper portion when situated in said upright ring position;

each of said oblong binder rings has a roughly-horizontal lower portion when situated in said upright ring position;

each of said oblong binder rings is reversibly compressible relative to a moderate compressive force roughly exerted in the direction of said minor diameter such that said column-like stiff portions resist permanent buckling while said bow-like flexible upper portions more readily flatten and widen outward to provide much of desired reversible vertical compressibility,

each of said oblong binder rings springs back to resume a relaxed expanded form upon removal of said moderate compressive force.

18. The binder of claim **17** further comprising:

at least one elastic pivot;

said elastic pivot enabling at least a ring one of said oblong binder rings to rotate relative to said planar portion of said spine.

19. The binder of claim **17** wherein at least one of said oblong binder rings has a protruding paper-catch ring-edge.

20. A loose-leaf binder comprising:

a cover;

a plurality of independently openable elastic binder rings that are each securely closable via a respective interlock closure;

at least one elastic pivot or hinge joint;

each of said interlock closures having a tab and a slot at opposing ends of a curved member that are snapped together flush to form a smooth securely-closed ring,

at least a portion of said cover is disposed in a flat formation with a near-ring edge when said cover is open 360 degrees,

each of said elastic binder rings aligned and attached to said cover adjacent said near-ring edge,

each of said elastic binder rings having an inner diameter greater than a thickness of said flat formation,

said elastic pivot or hinge joint located adjacent said near-ring edge and enabling a portion of at least one of said elastic binder rings to rotate about said near-ring edge;

said elastic pivot or hinge joint is disposed flush or flatly relative to said flat formation of said cover to enable a sufficiently smooth surface for writing on ring-bound loose-leaves stacked thereon, and said elastic pivot or hinge joint remaining flush or flat relative to said flat formation when said portion of at least one of said elastic binder rings rotates about said near-ring edge,

a portion of each of said elastic binder rings rotatable about said near-ring edge to enable each of said elastic binder rings to straddle the two parallel geometric planes respectively containing the top and bottom surfaces of said flat formation of said cover,

said elastic pivot or hinge joint is roughly axially disposed relative to opposing rotations of said flat formation and said elastic binder rings while said elastic binder rings remain closed,

whereby ring-bound loose-leaves stacked flatly above said flat formation are substantially parallel to ring-bound loose-leaves stacked flatly below said flat formation when said binder is open 360 degrees and placed on a flat surface.

21. The binder of claim **20** wherein said cover comprises a front cover, middle cover, and back cover, said front cover comprising a semi-rigid board, said back cover comprising a semi-rigid board, said middle cover comprising a flexible foldable material, said middle cover joining said front cover to said back cover.

22. The binder of claim **21** wherein said front cover has loose-leaf holes, said front cover being ring-bound on said elastic binder rings like a loose-leaf.

23. The binder of claim **20** wherein said flat formation of said cover has margin supports separated by ring slots, said ring slots respectively receive said elastic binder rings to enable rotation of said elastic binder rings through the near-ring edge of said flat formation of said cover, whereby said margin supports provide writing support to loose-leaves between the punched ring holes and the adjacent loose-leaf edge.

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(54) **LOOSE-LEAF BINDER**

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(58) **Field of Classification Search** 402/73, 402/76, 77; 281/29, 36, 37; D19/27
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

659,860	A	10/1900	Schild
842,851	A	2/1907	Boden
854,074	A	5/1907	Bryant
857,377	A	6/1907	Baker
901,549	A	10/1908	Nelson
924,647	A	6/1909	Eddy
974,831	A	11/1910	Scherzinger
1,228,866	A	6/1917	Amoroso
1,398,388	A	11/1921	Murphy
1,710,493	A	4/1929	Van Valkenburgh
1,827,592	A	10/1931	Lewis

(Continued)

FOREIGN PATENT DOCUMENTS

GB	2190331	11/1987

OTHER PUBLICATIONS

http://www.gbcoffice.com/products/binding/proclicksupplies.asp Mar. 4, 2004 (entitled "GBC ProClick™ spines").

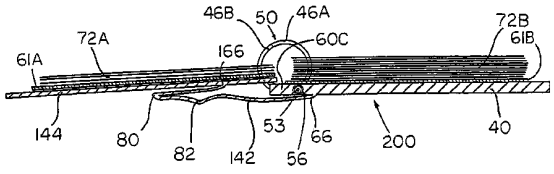
(Continued)

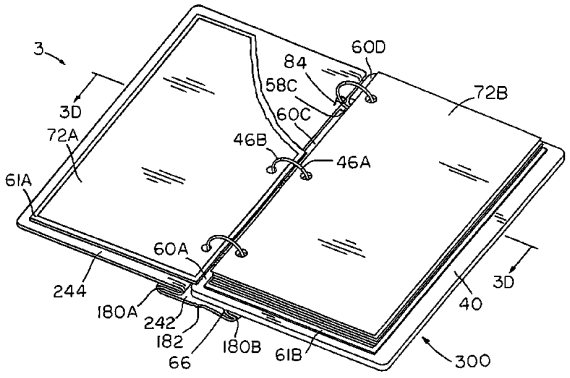
Primary Examiner—Willmon Fridie, Jr.
(74) *Attorney, Agent, or Firm*—Morgan & Finnegan, L.L.P.

(57) **ABSTRACT**

A binder for releasably retaining loose-leaves. The binder has a front cover that lies flatly beneath its back cover when the binder is open 360 degrees. The rings of the binder can rotate around an edge of the flatly-folded cover to enable loose-leaves to lie flat above and below the cover. The binder also has a skeleton with a minimal cross-section spine which may be partially or completely embedded in a cover and rotates in relation to parallel front and back covers when the binder is open 360 degrees. The front cover, middle cover and back cover are connected in a way so that they do not interfere with the rotation of the rings. Mechanisms to open and close the rings of the skeleton to allow addition or removal of loose-leafs, and ring shapes to optimize or stabilize the capacity of the binder during operation are also disclosed.

30 Claims, 44 Drawing Sheets





U.S. PATENT DOCUMENTS

2,051,738	A	8/1936	Ottinger	129/1
2,185,004	A	12/1939	Trussell	281/25
2,206,317	A	7/1940	Behn	129/24
2,268,431	A	12/1941	Slonneger	129/24
2,331,461	A	10/1943	Dawson et al.	129/1
2,715,906	A	8/1955	Lucchesi	129/24
2,764,162	A	9/1956	Valla	129/1
2,924,221	A	2/1960	Dudley-Smith	129/10
3,190,293	A	6/1965	Schneider et al.	129/24
4,130,368	A	12/1978	Jacoby et al.	402/41
4,798,491	A	1/1989	Lä ssle	402/39
4,815,882	A	3/1989	Ohminato	402/34
4,848,948	A	7/1989	Pitts	402/29
4,904,103	A	2/1990	Im	402/35
4,919,557	A	4/1990	Podosek	402/41
4,930,925	A	6/1990	Baldwin et al.	402/30
5,015,114	A	5/1991	Miller	402/4
5,213,429	A	5/1993	Johnson	
5,333,962	A	8/1994	Johnson	
5,553,959	A	9/1996	Feldman et al.	402/79
5,642,954	A	7/1997	Hudspith	
5,697,646	A *	12/1997	Venegas	281/37
5,975,784	A	11/1999	Whaley	402/34
6,168,337	B1	1/2001	Adams	
6,196,749	B1	3/2001	Chizmar	402/42
6,213,668	B1 *	4/2001	Brown et al.	402/26
6,371,678	B1 *	4/2002	Chizmar	402/42
6,431,779	B1 *	8/2002	Moor et al.	402/73
6,702,501	B2 *	3/2004	Chizmar	402/42
6,935,497	B1 *	8/2005	Domotor et al.	206/320

OTHER PUBLICATIONS

http://www.gbcoffice.com/products/binding/zipbindsupplies.asp Mar. 4, 2004 (entitled "GBC ZipBind™ spines").
GBC office products "proClick" product literature (2 sheets).
http://www.usringbinder.com/plastix.htm Aug. 26, 2003.
http://www.rickieworld.com.hk/products/D-3.htm Aug. 27, 2003 (entitled "Memo Mechanism Trigger Type-6-Ring (Plastic)").

* cited by examiner

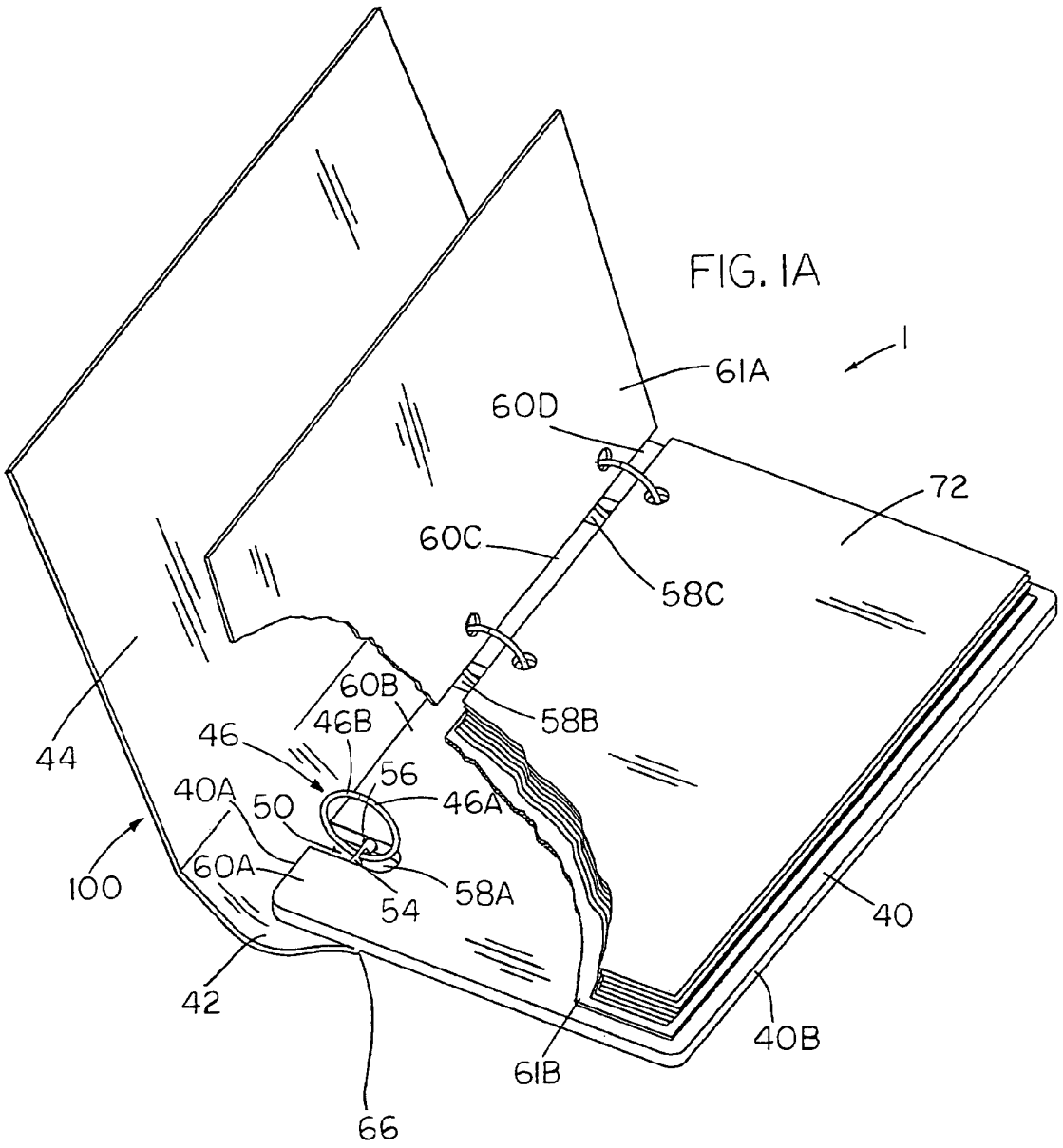
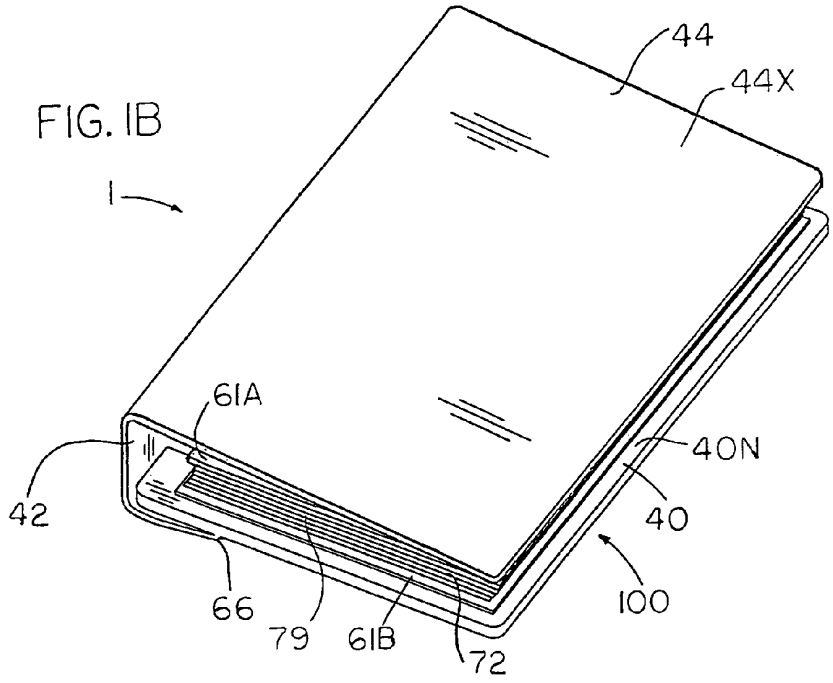


FIG. 1A
1
61A
60D
72
60C
58C
60B
58B
46
46B
44
56
40A
50
46A
60A
58A
100
54
40
42
40B
61B
66

FIG. 1B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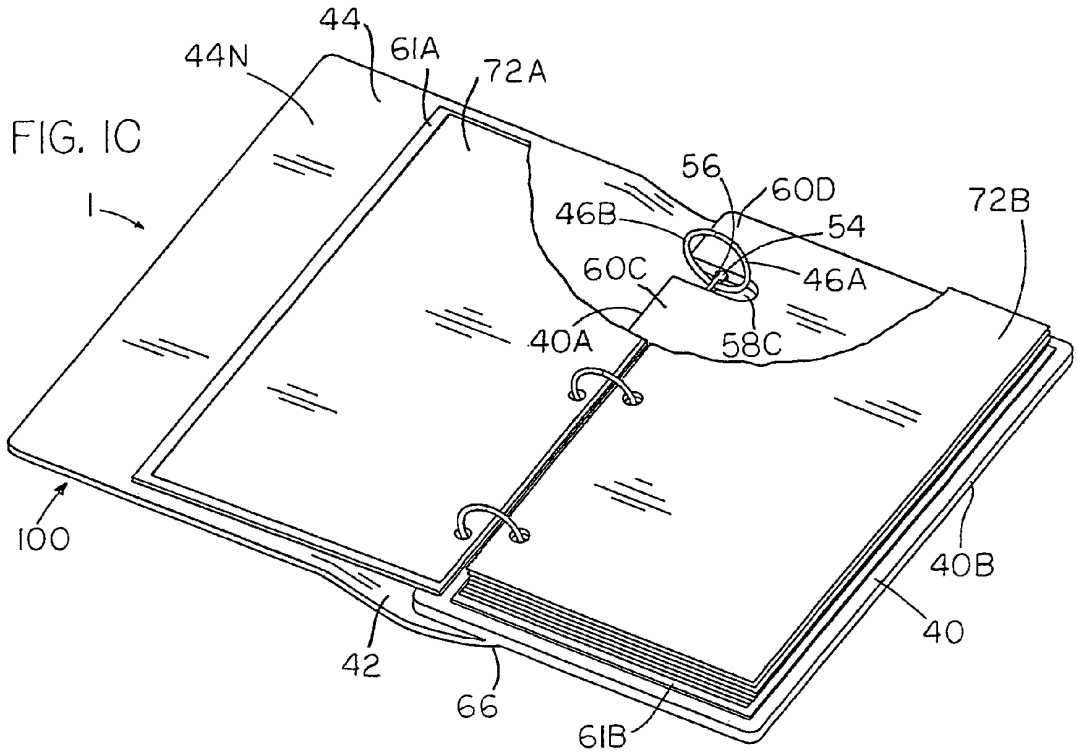
44X
1
61A
42
40N
40
66
79
61B
72
100

FIG. 1C


44
44N
61A
72A
1
56
60D
72B
46B
54
60C
46A
40A
58C
100
40B
40
42
66
61B

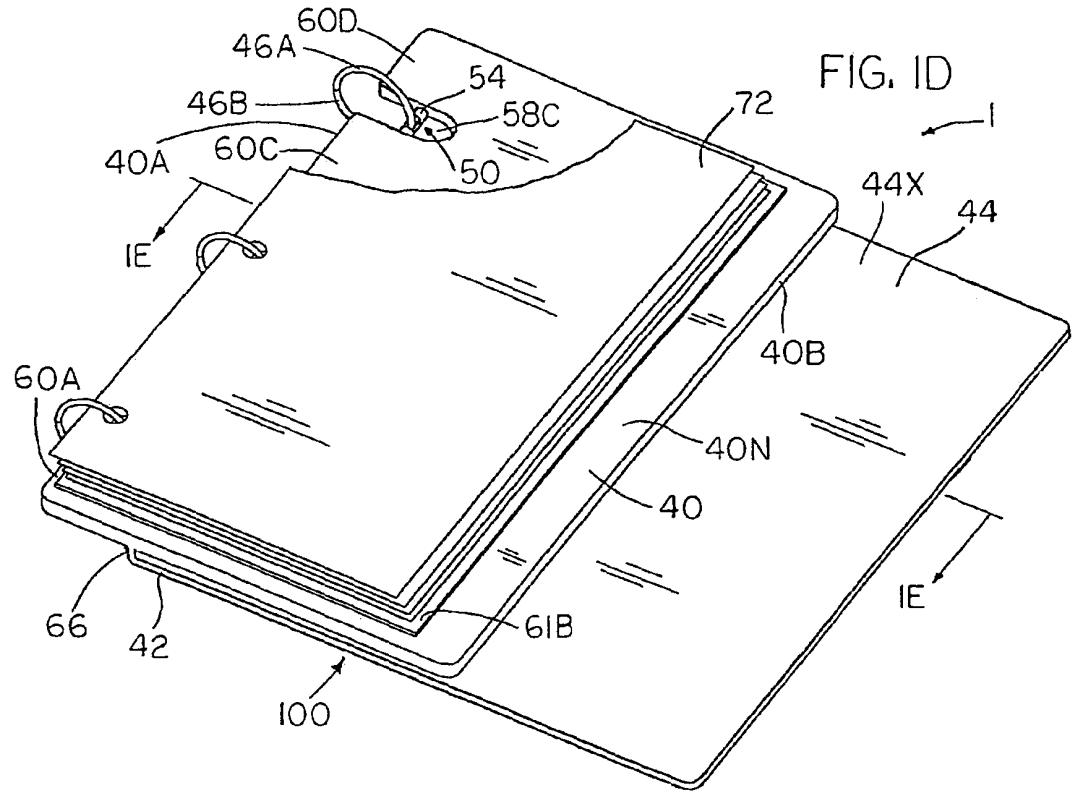


FIG. ID

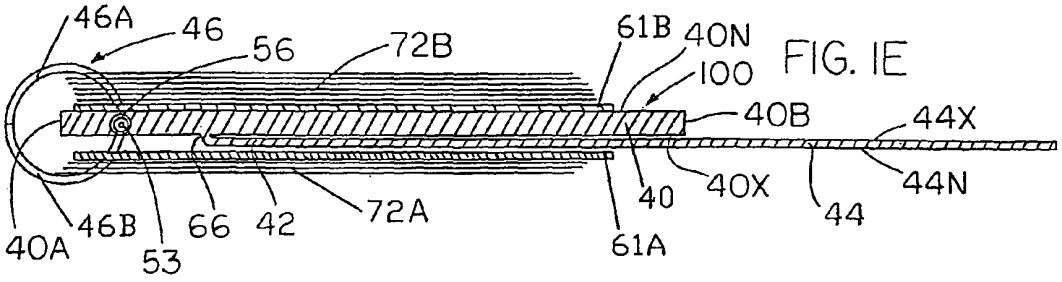


FIG. IE

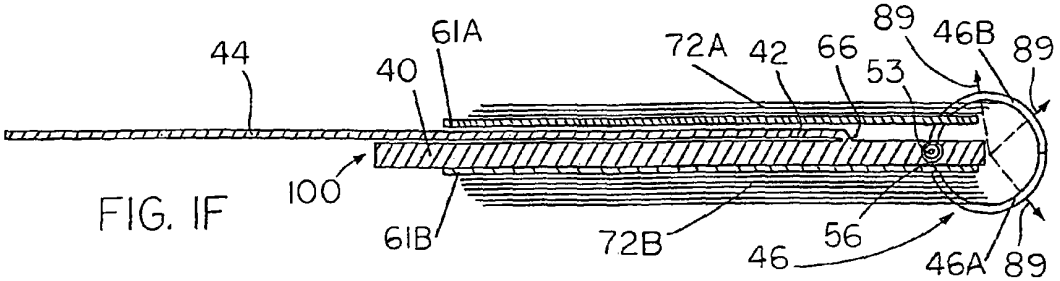


FIG. IF

FIG. 1G

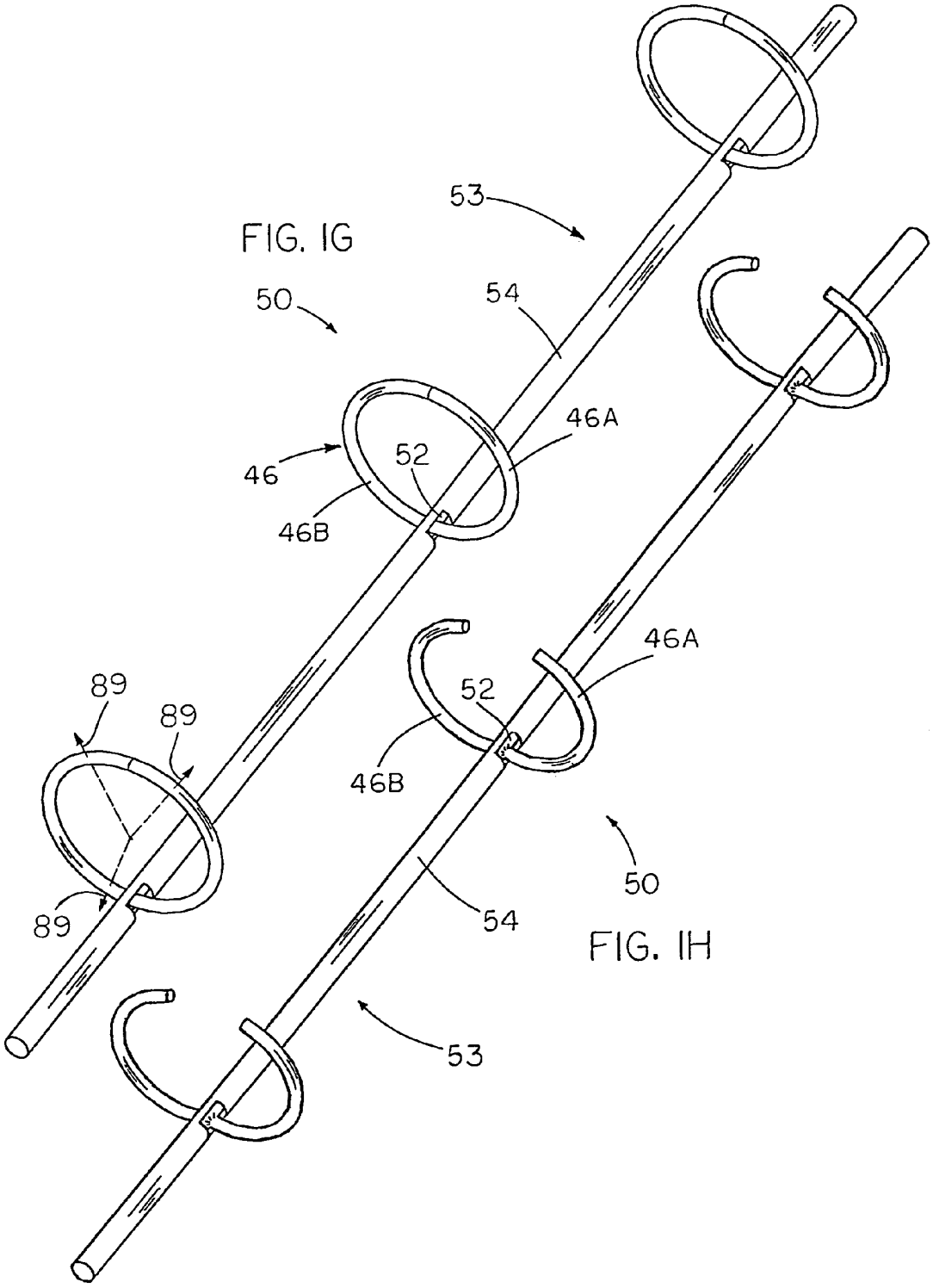


FIG. 1H

FIG. II

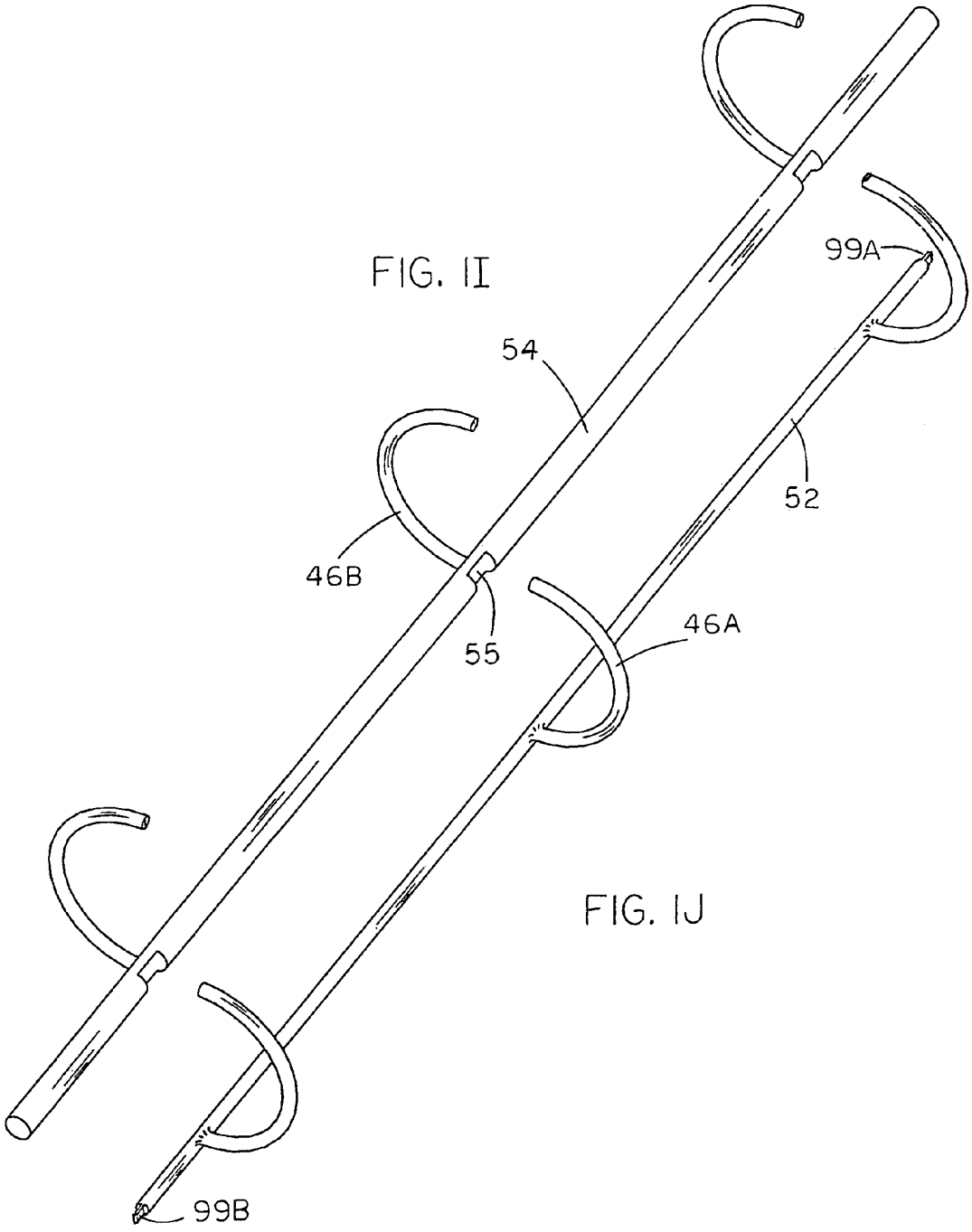


FIG. IJ

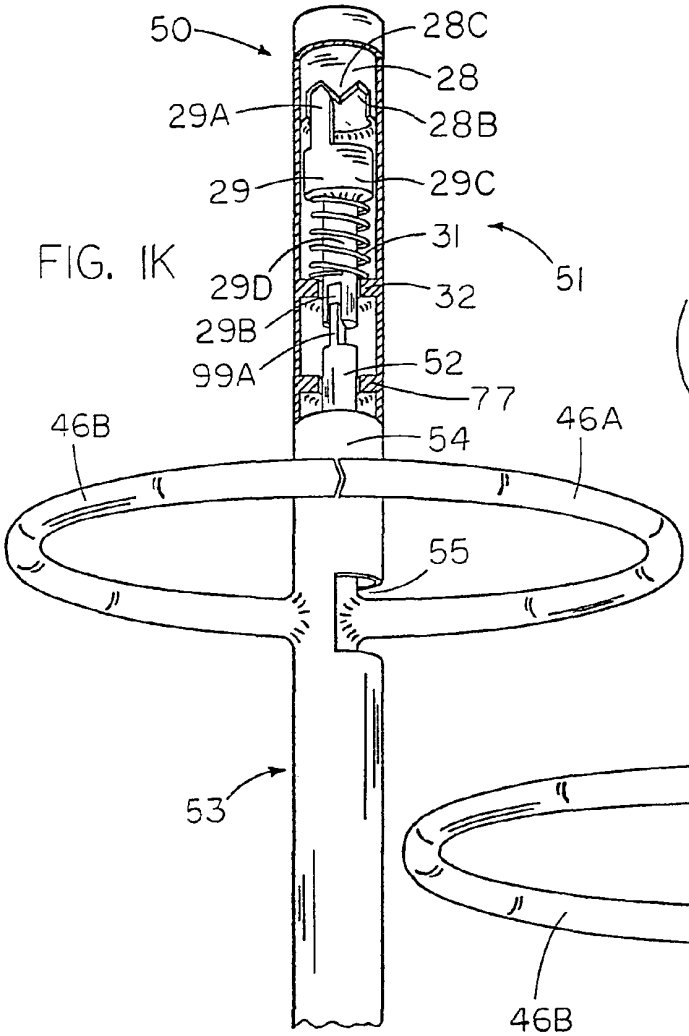

50
28C
28
29A
28B
29
29C
31
51
29D
32
29B
99A
52
77
46B
54
46A
55
53

FIG. 1K

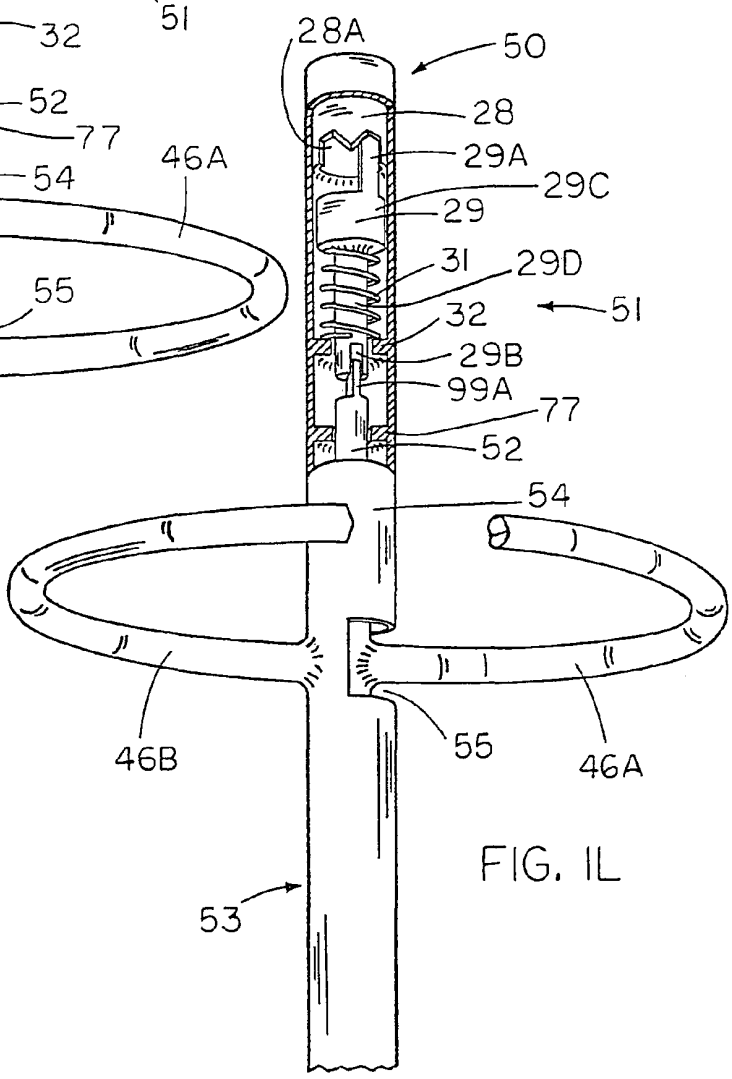

28A
50
28
29A
29C
29
31
29D
51
32
29B
99A
77
52
54
46B
55
46A
53

FIG. 1L

FIG. 2A

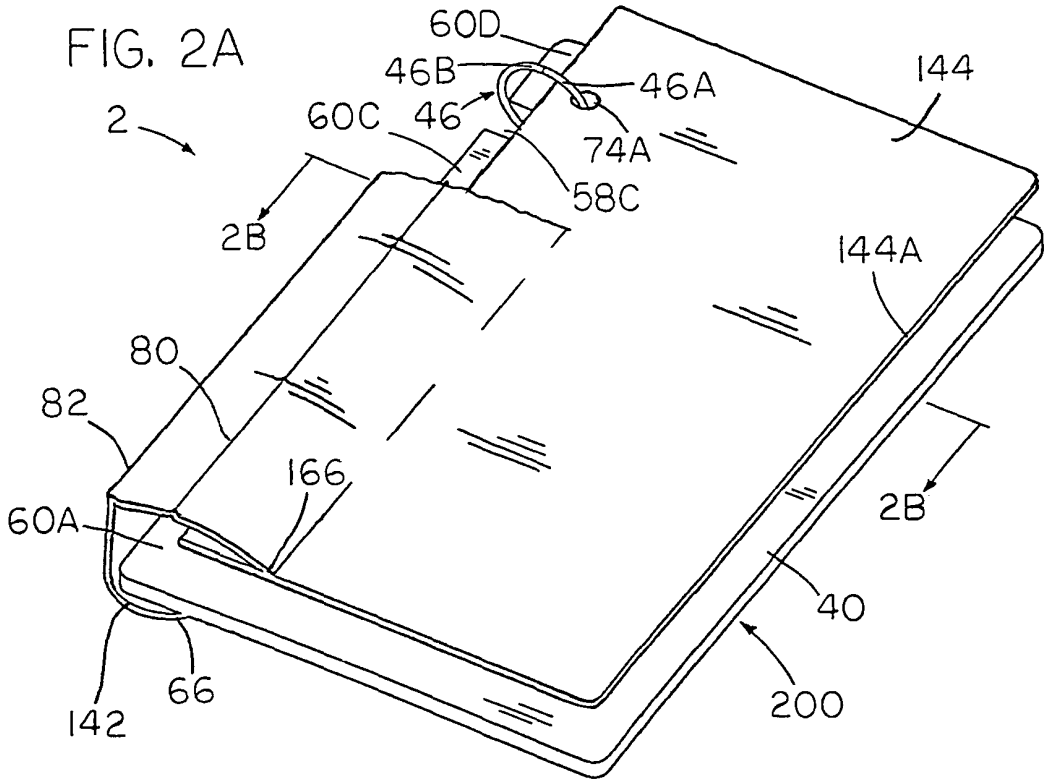
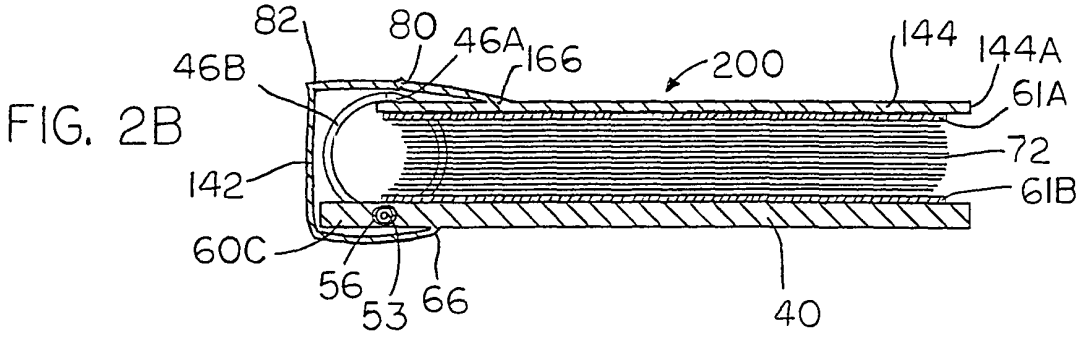

60D
46B
46A
144
2
60C
46
74A
58C
2B
144A
80
82
166
60A
2B
40
66
142
200

FIG. 2B


82
80
46A
166
200
144
144A
46B
61A
72
142
61B
60C
56
53
66
40

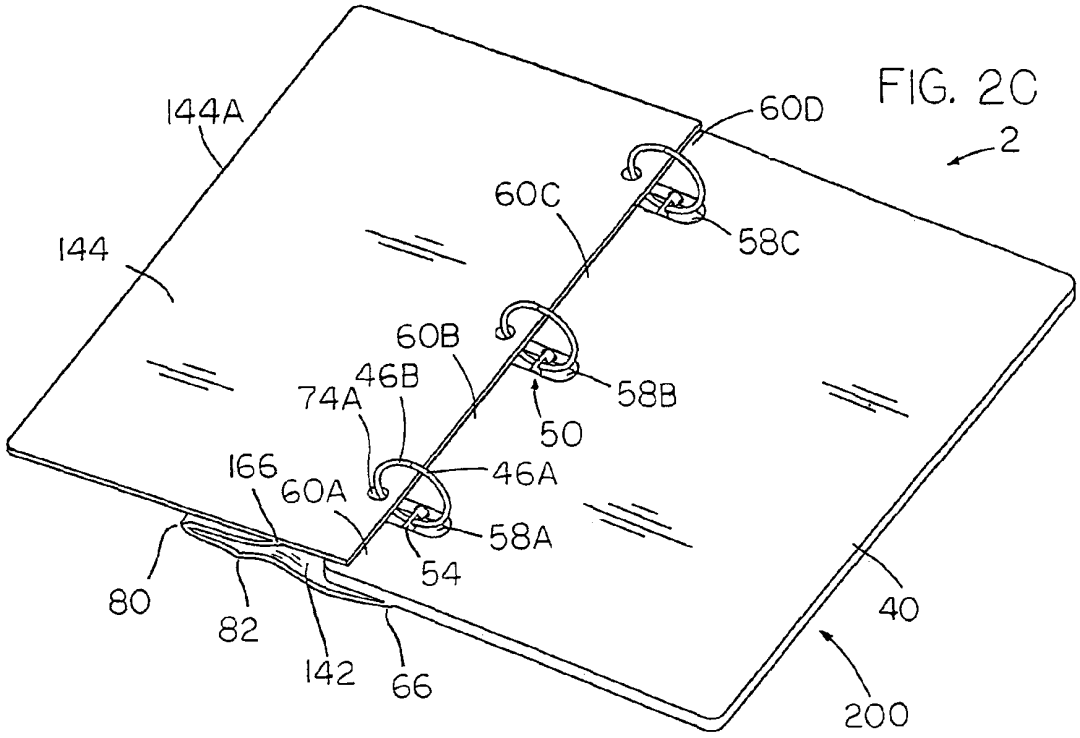


FIG. 2C

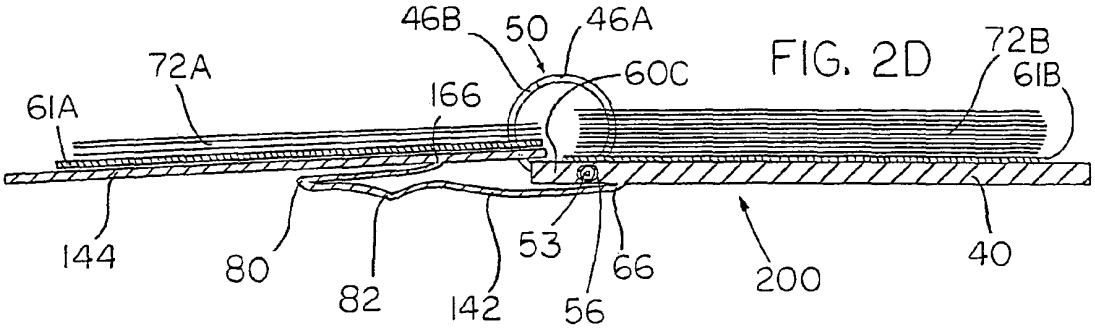


FIG. 2D

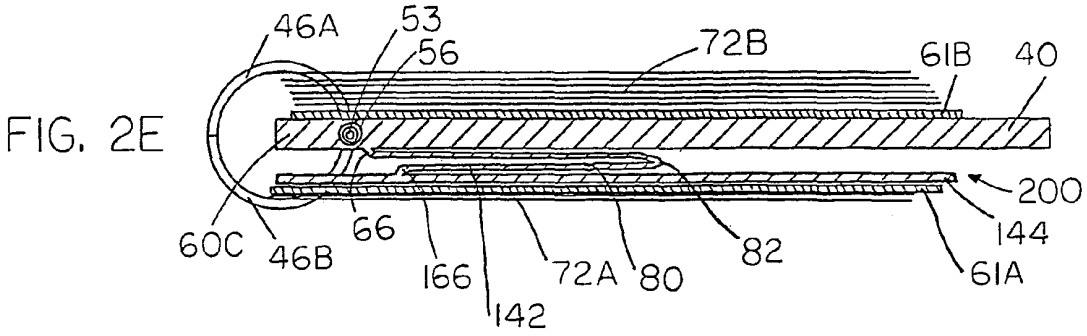


FIG. 2E

FIG. 3A

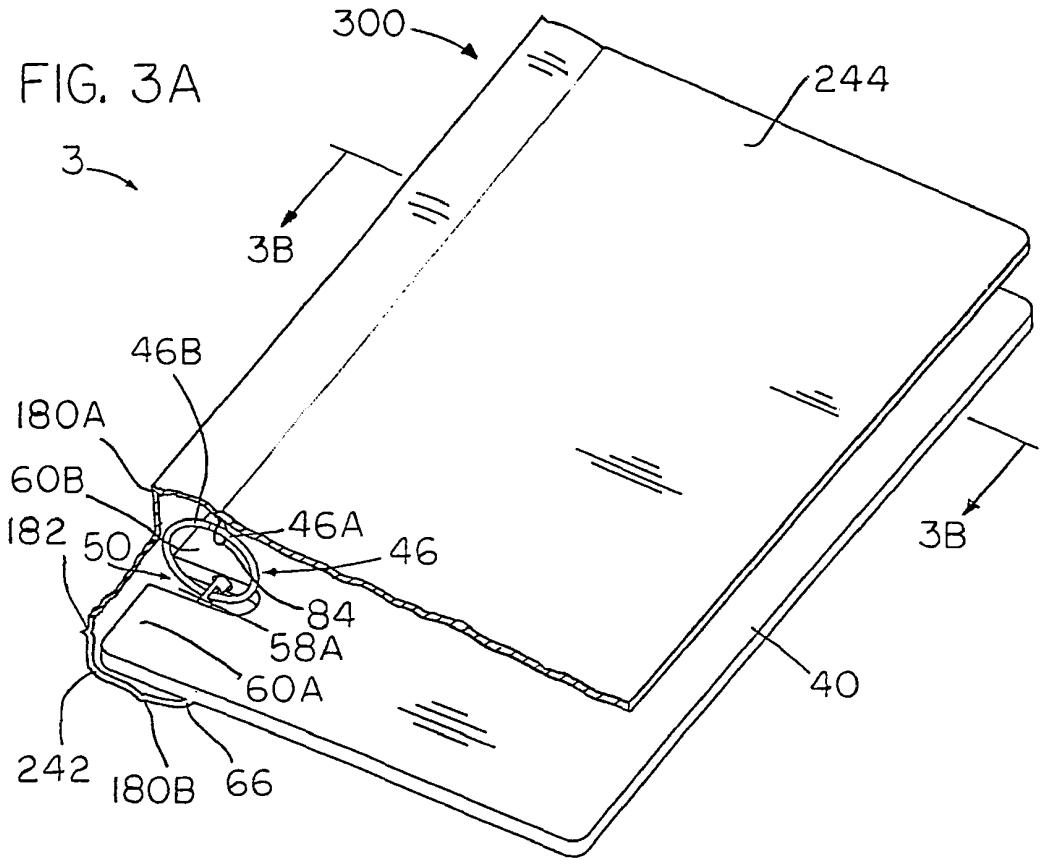

300
244
3
3B
46B
180A
60B
182
50
46A
46
84
58A
60A
40
3B
242
180B
66

FIG. 3B

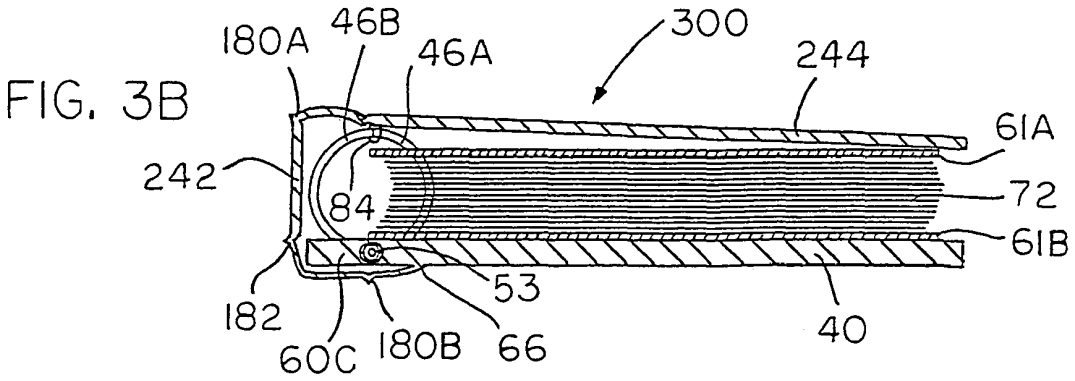

180A
46B
46A
300
244
61A
242
84
72
61B
53
182
60C
180B
66
40

FIG. 3C

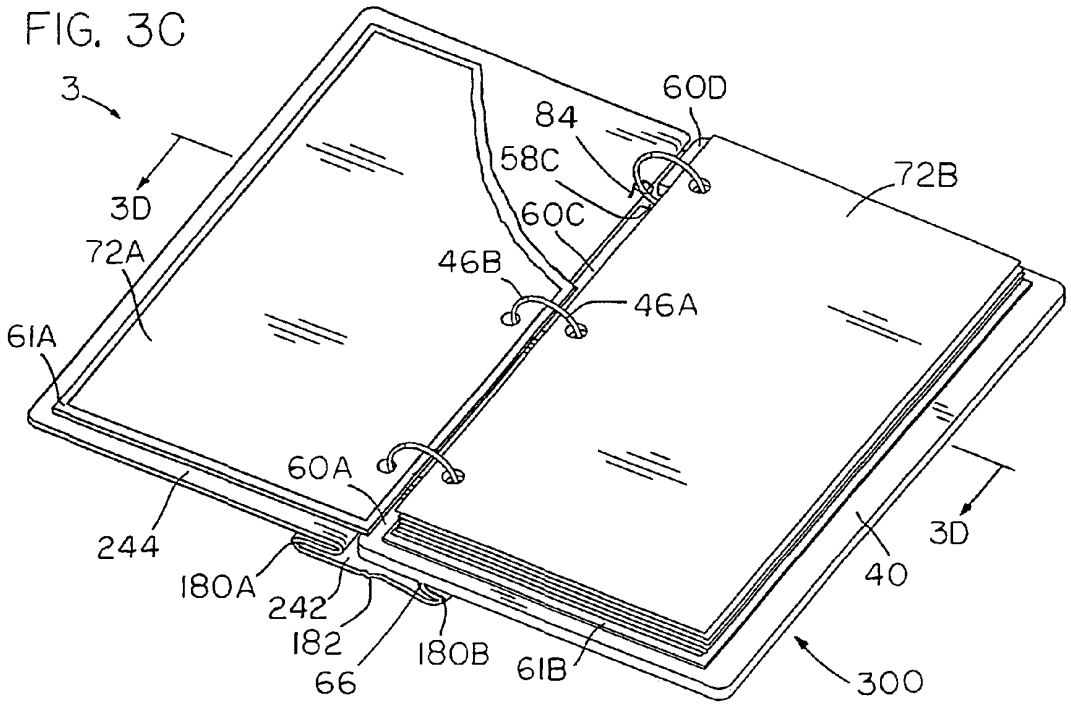


FIG. 3D

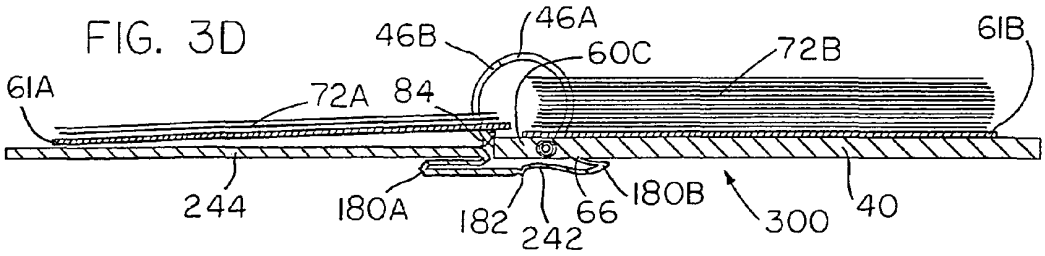


FIG. 3E

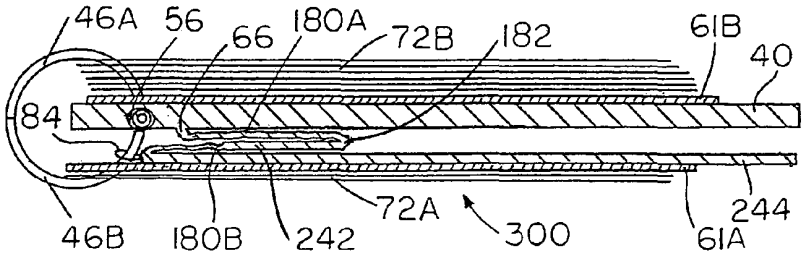


FIG. 4A

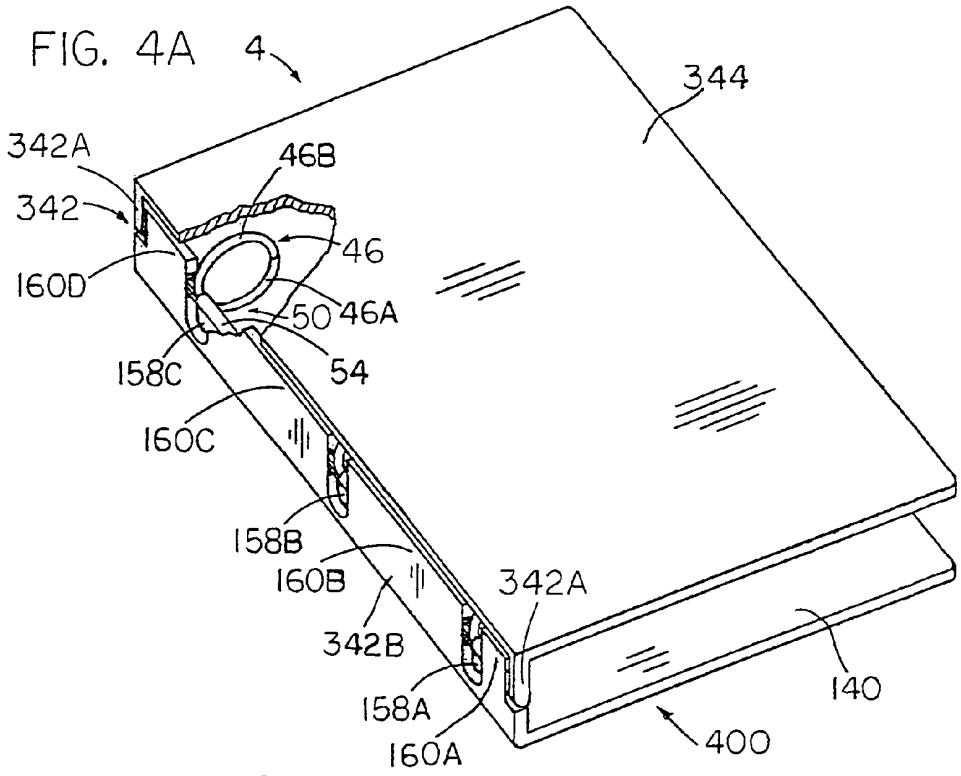

4
344
342A
46B
342
46
160D
50
46A
158C
54
160C
158B
160B
342A
342B
158A
140
160A
400

FIG. 4B

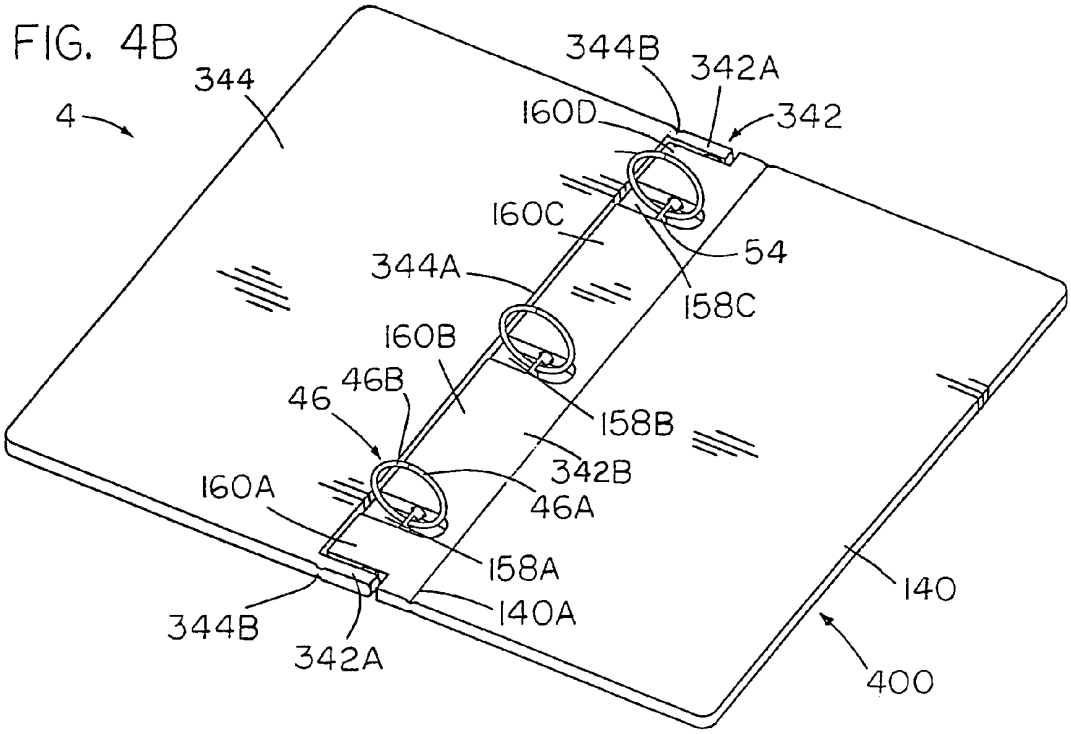

344
4
344B
342A
160D
342
160C
54
344A
158C
160B
46
46B
158B
342B
160A
46A
158A
140
344B
140A
342A
400

FIG. 4C

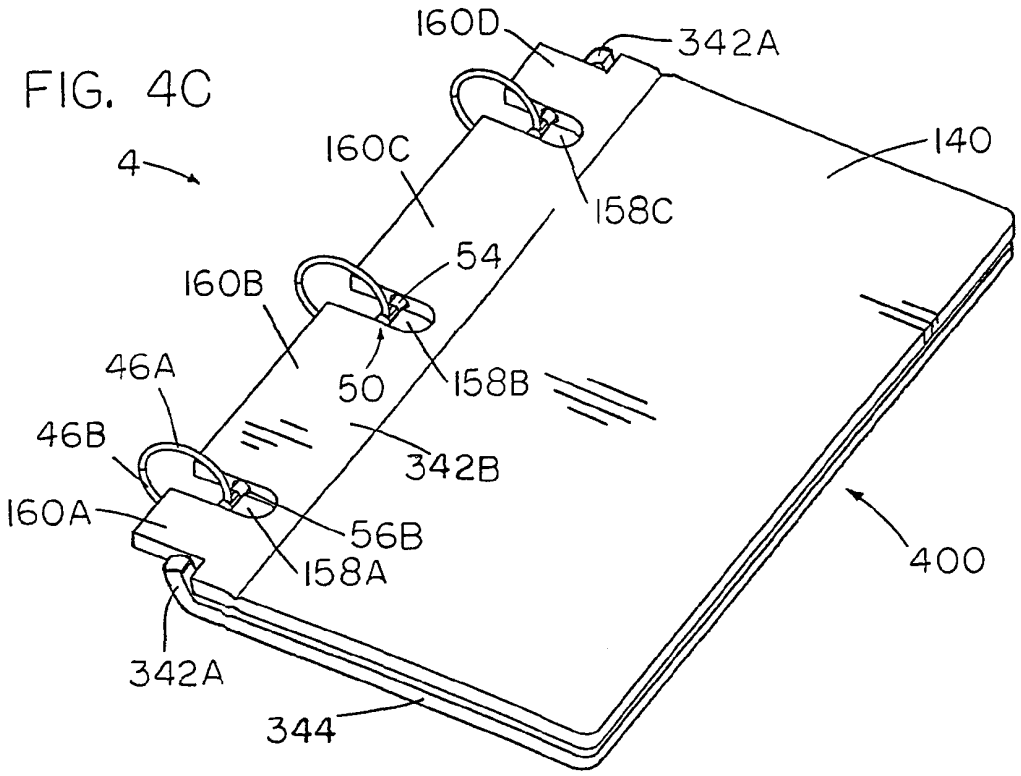

160D
342A
140
4
160C
158C
54
160B
46A
50
158B
46B
342B
160A
56B
158A
400
342A
344

FIG. 4D

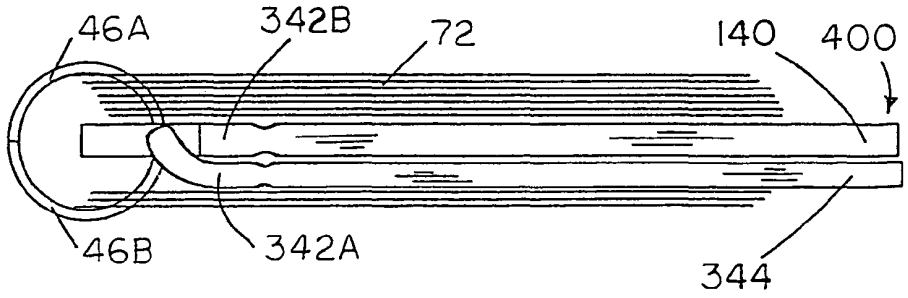

46A
342B
72
140
400
46B
342A
344

FIG. 5A

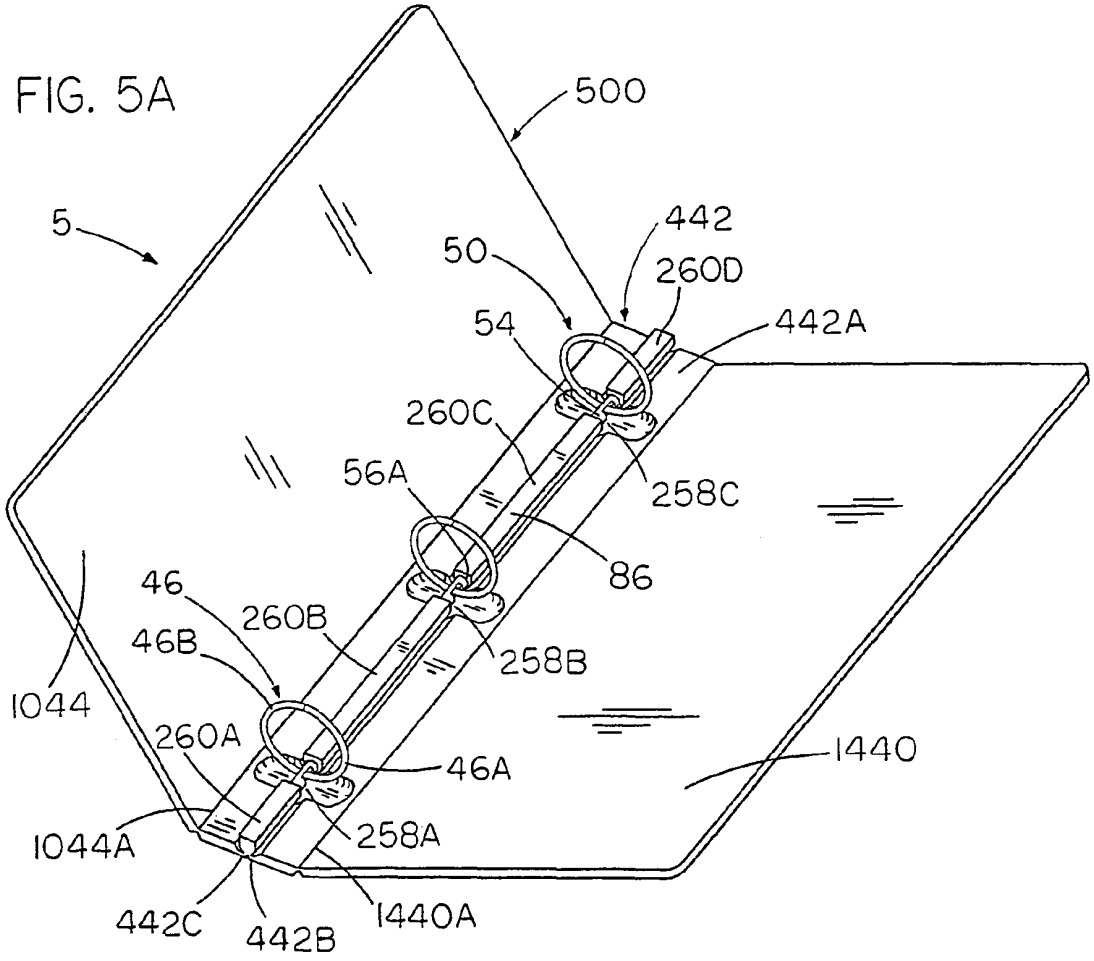

500
5
442
50
260D
54
442A
260C
56A
258C
86
46
260B
46B
258B
1044
260A
46A
1440
1044A
258A
442C
442B
1440A

FIG. 5B

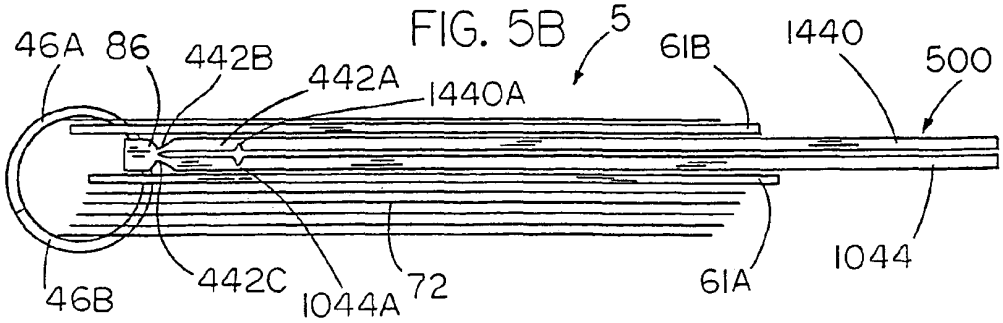

5
46A
86
442B
442A
1440A
61B
1440
500
46B
442C
1044A
72
61A
1044

FIG. 6A

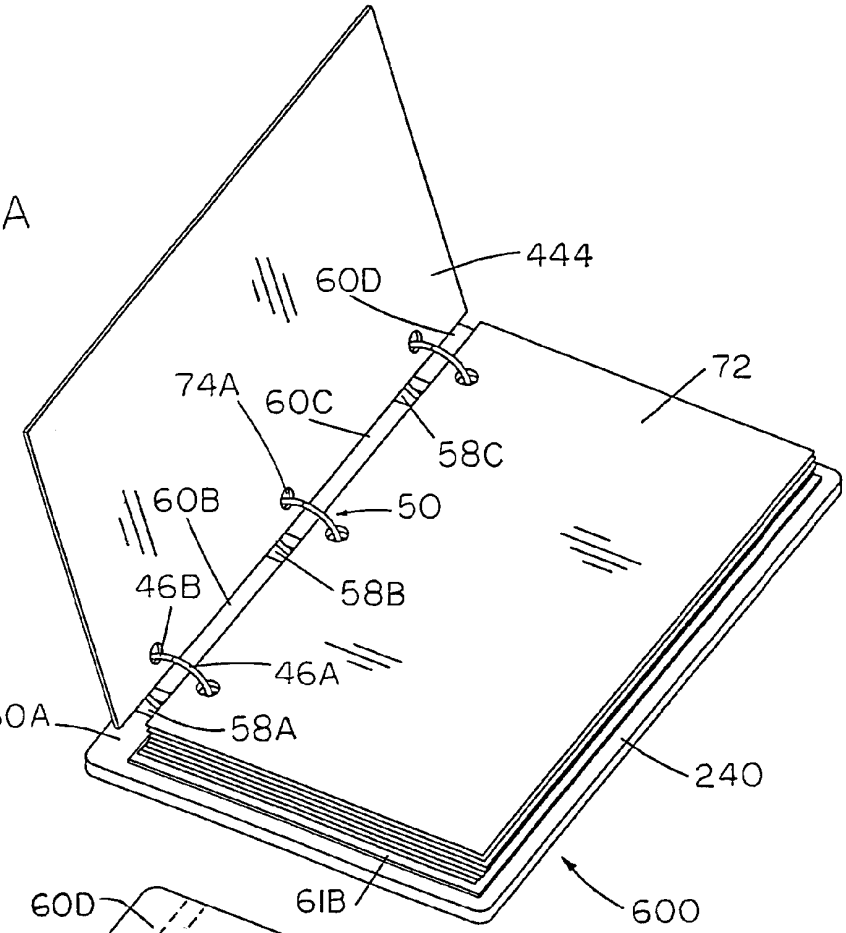
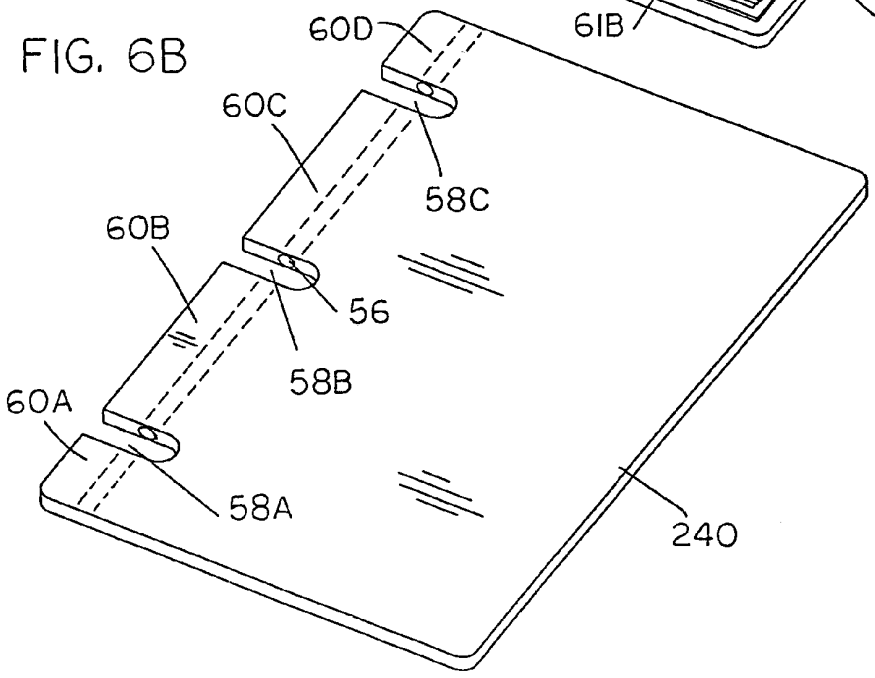

6
444
60D
72
74A
60C
58C
60B
50
46B
58B
46A
60A
58A
240
61B
600

FIG. 6B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60C
58C
60B
56
58B
60A
58A
240

FIG. 7A

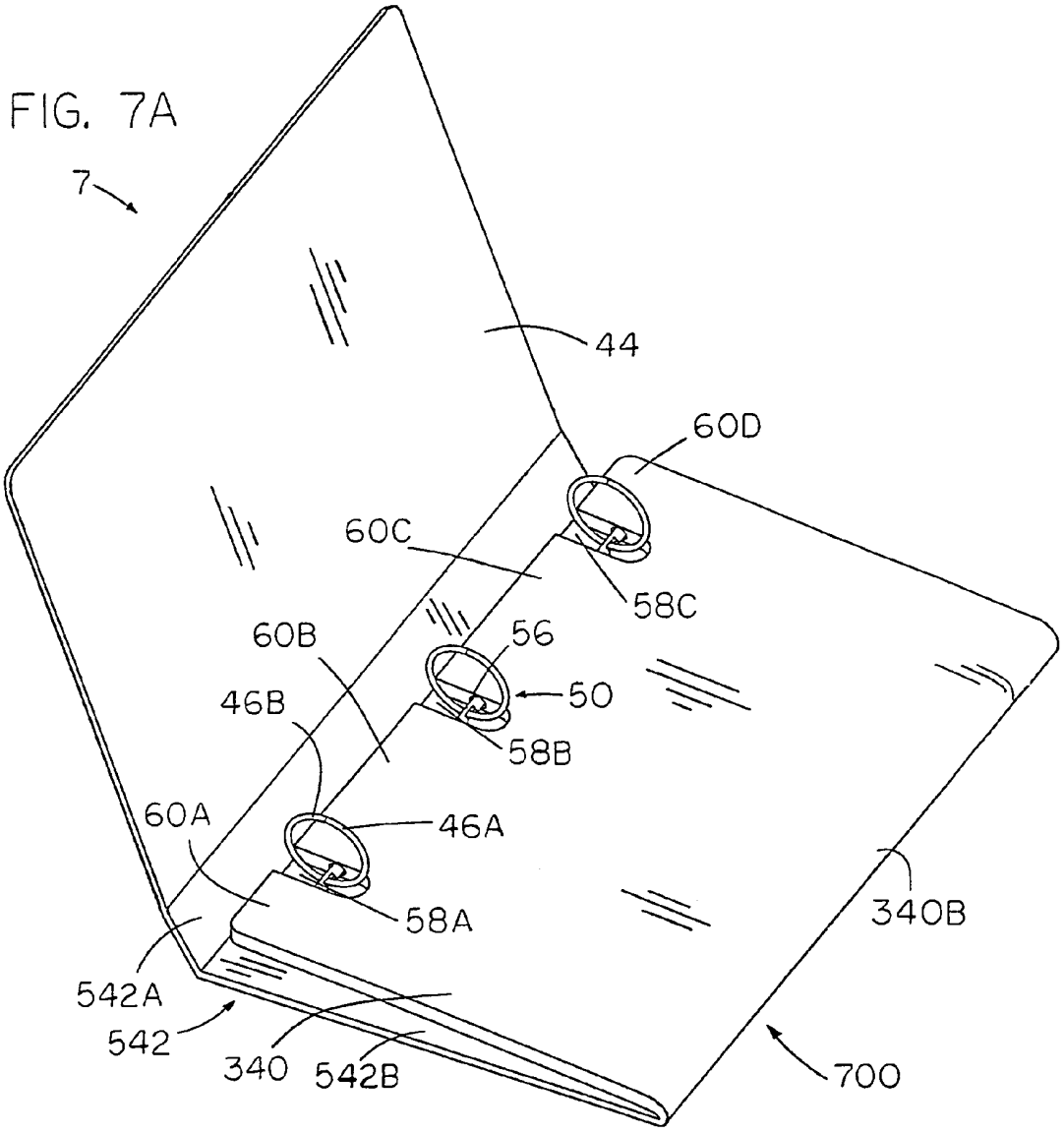
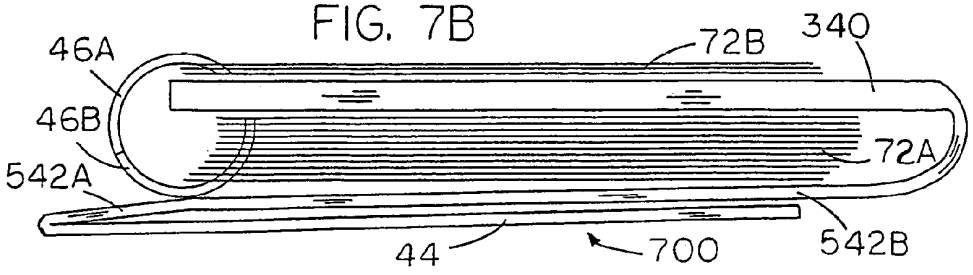

7
44
60D
60C
58C
60B
56
50
46B
58B
60A
46A
58A
340B
542A
542
340
542B
700

FIG. 7B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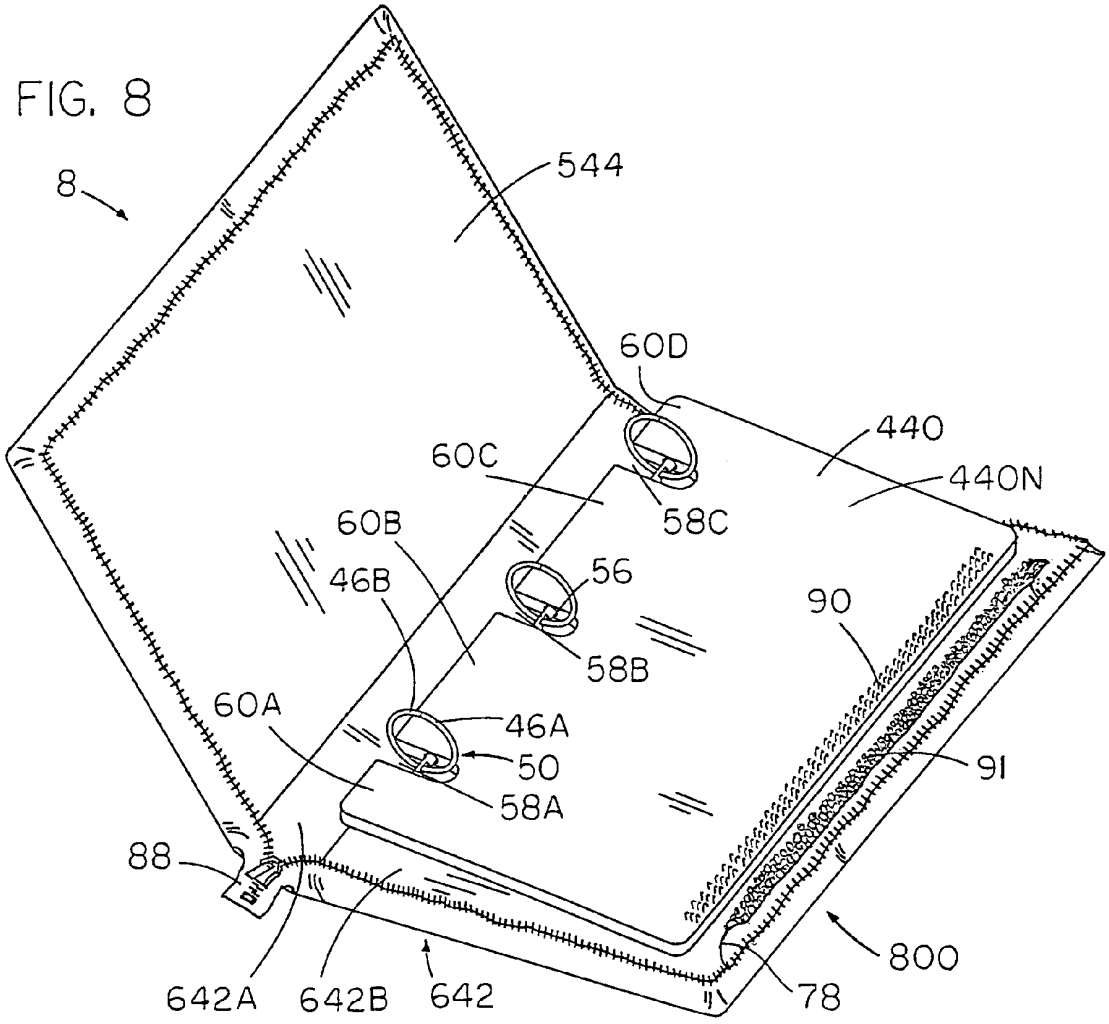
46B
72A
542A
44
700
542B

FIG. 8


8
544
60D
440
440N
60C
58C
60B
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90
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60A
46A
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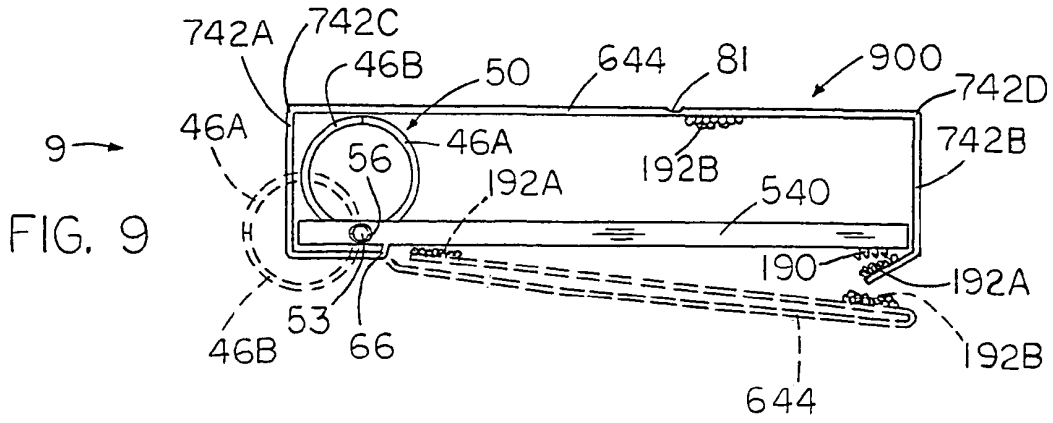
58A
91
88
800
642A
642B
642
78



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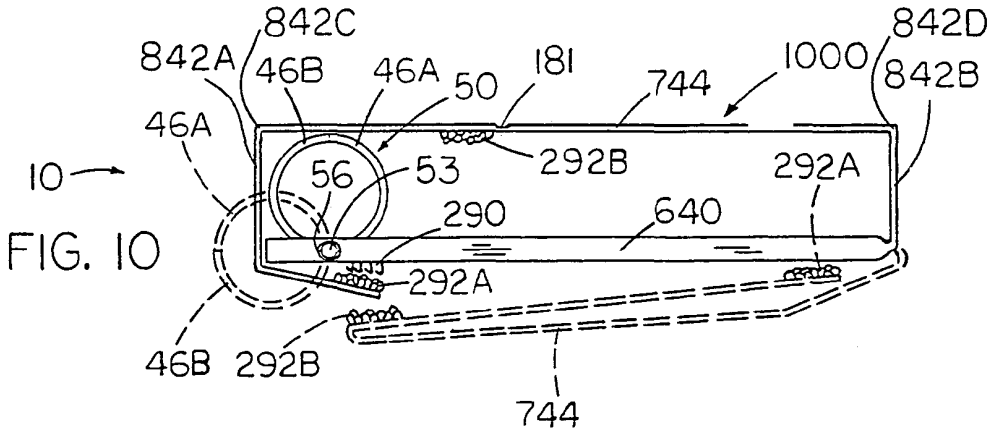

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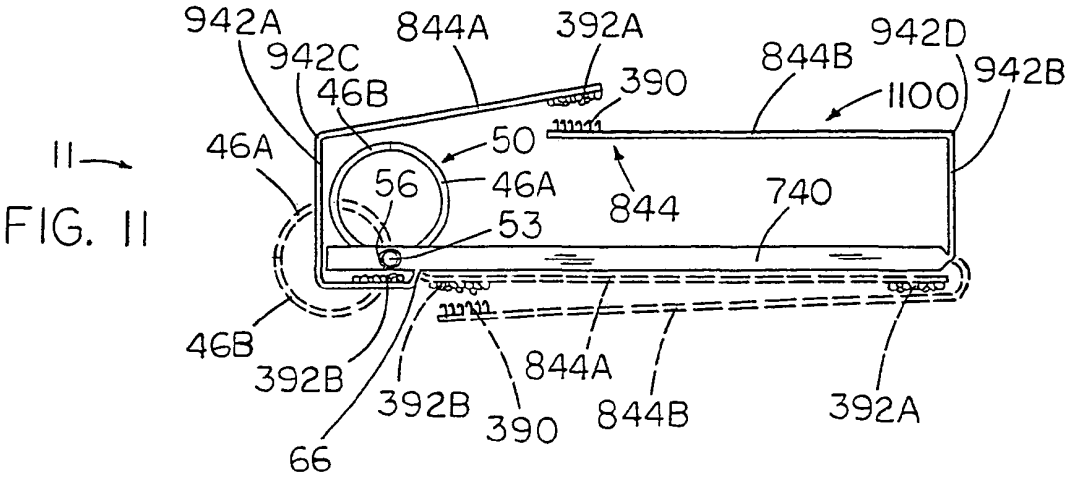
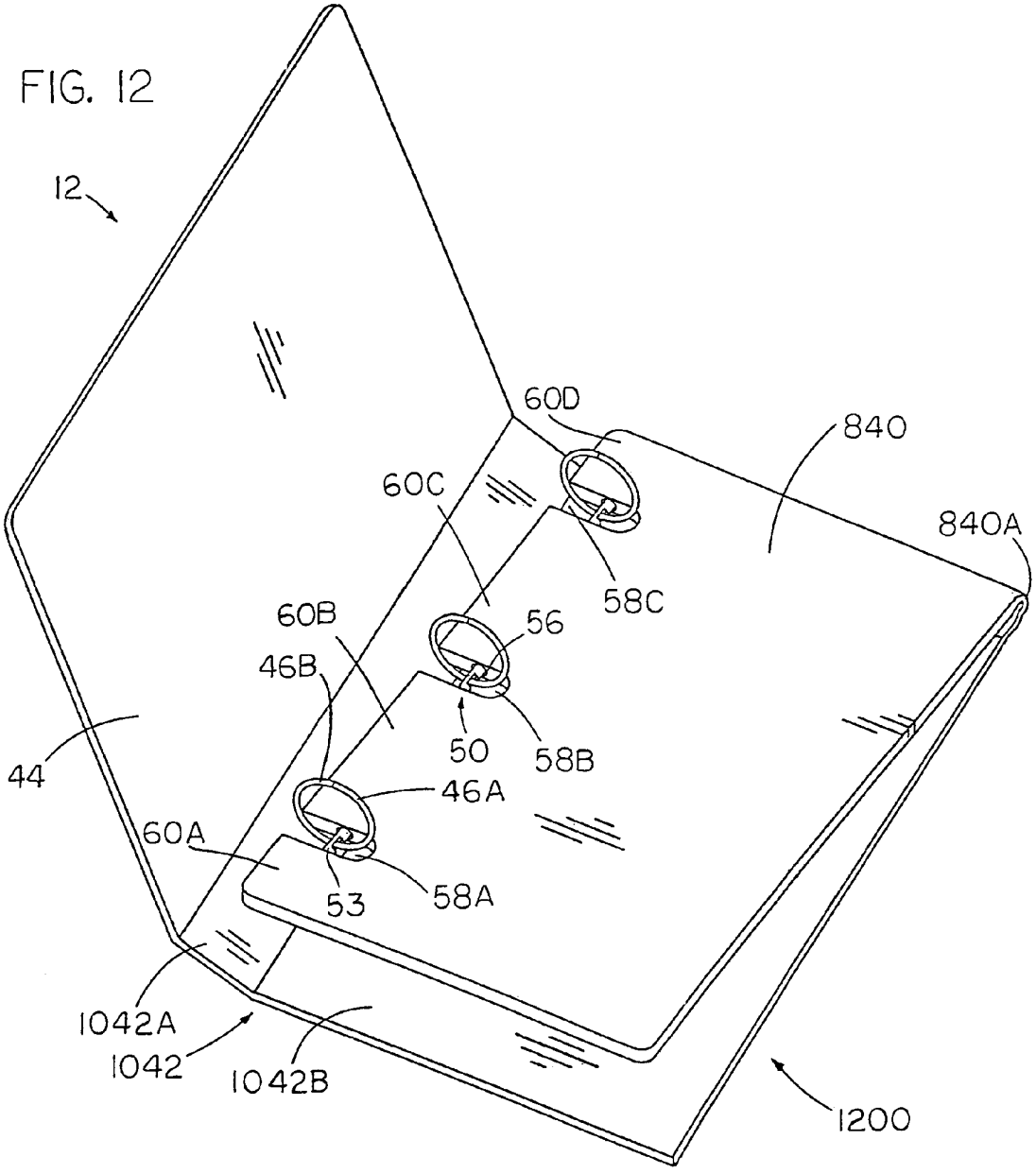


FIG. 11

FIG. 12


12
60D
840
60C
840A
58C
60B
56
46B
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58B
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46A
60A
53
58A
1042A
1042
1042B
1200

FIG. 13A

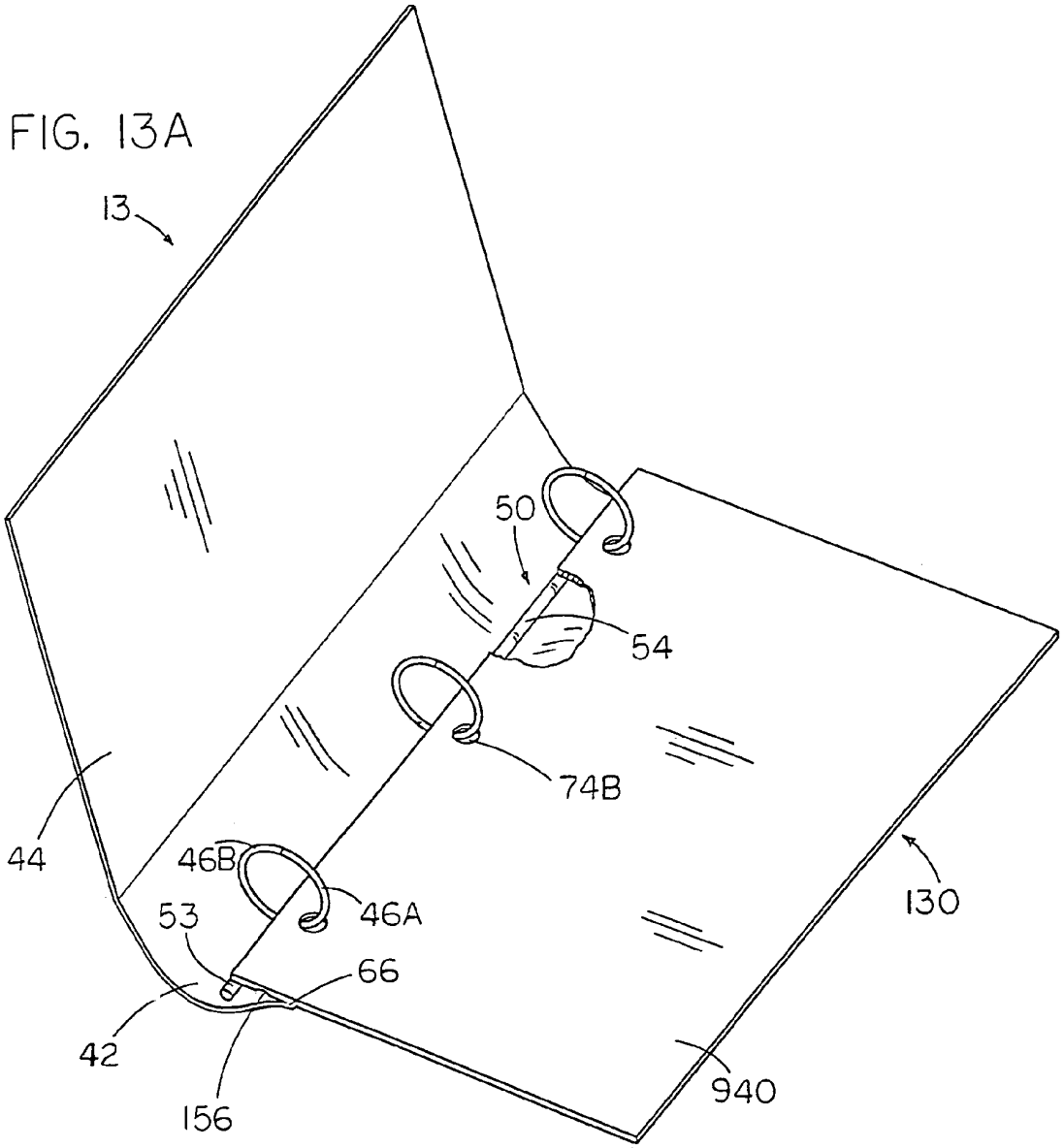


FIG. 13B

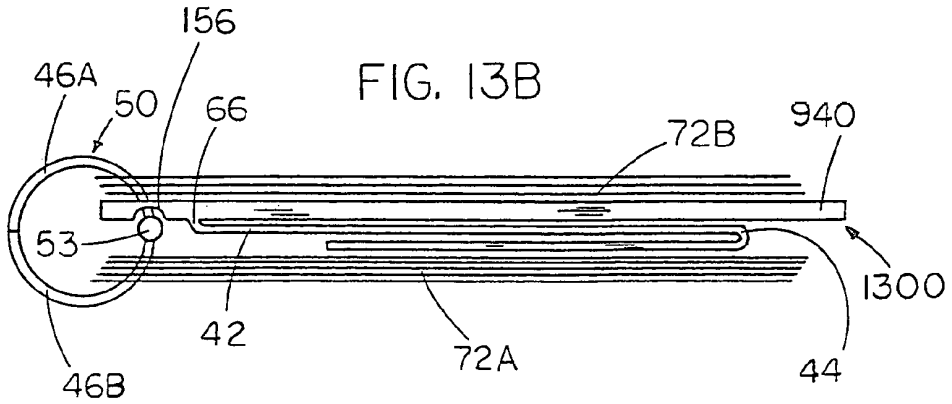


FIG. 14A

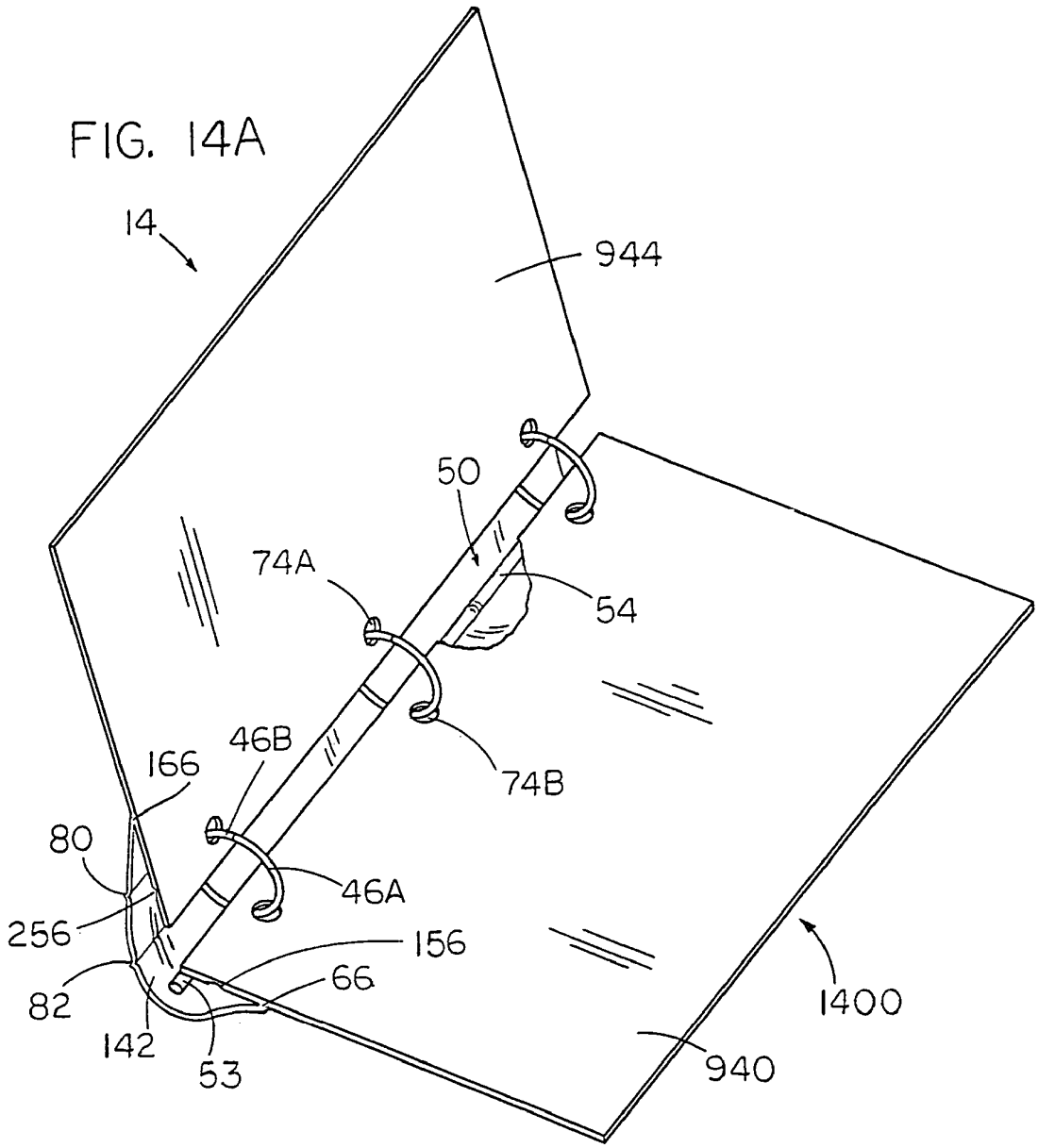


FIG. 14B

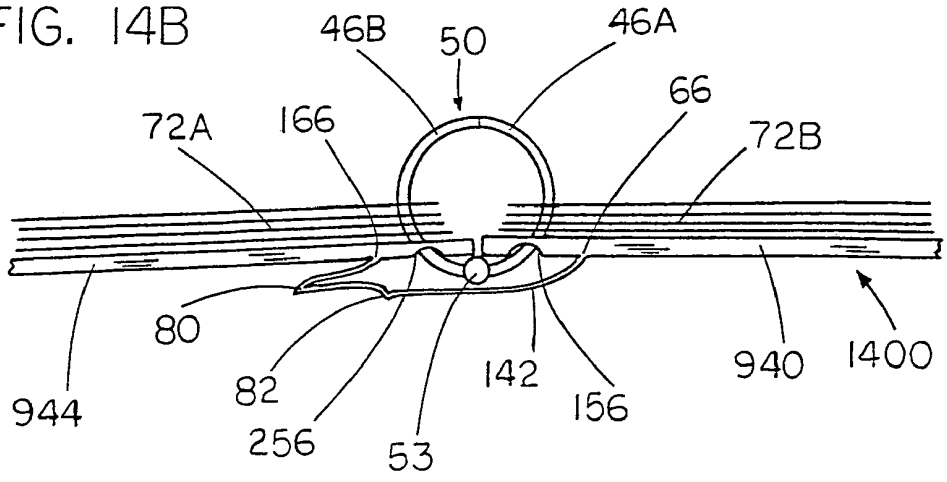


FIG. 14C

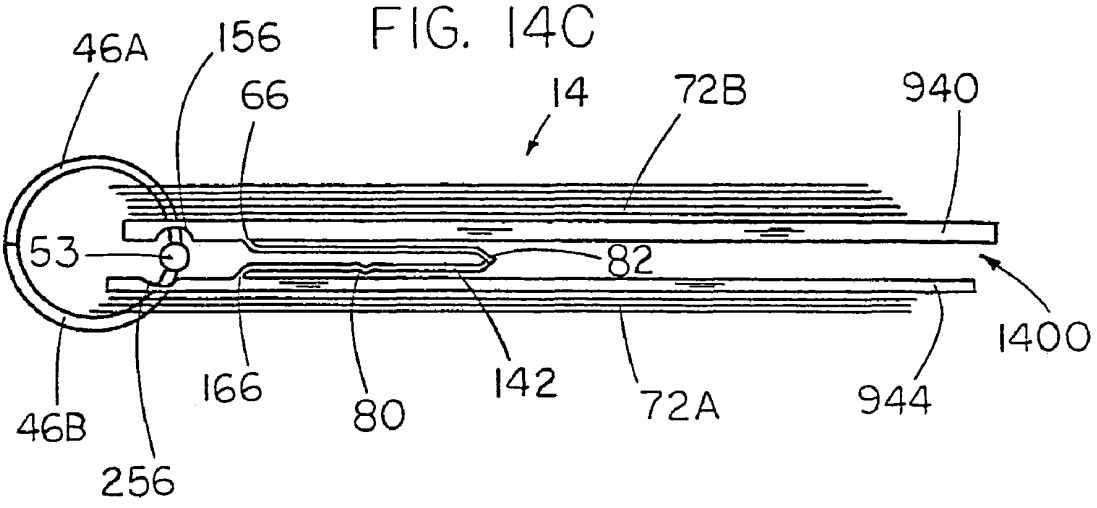


FIG. 15

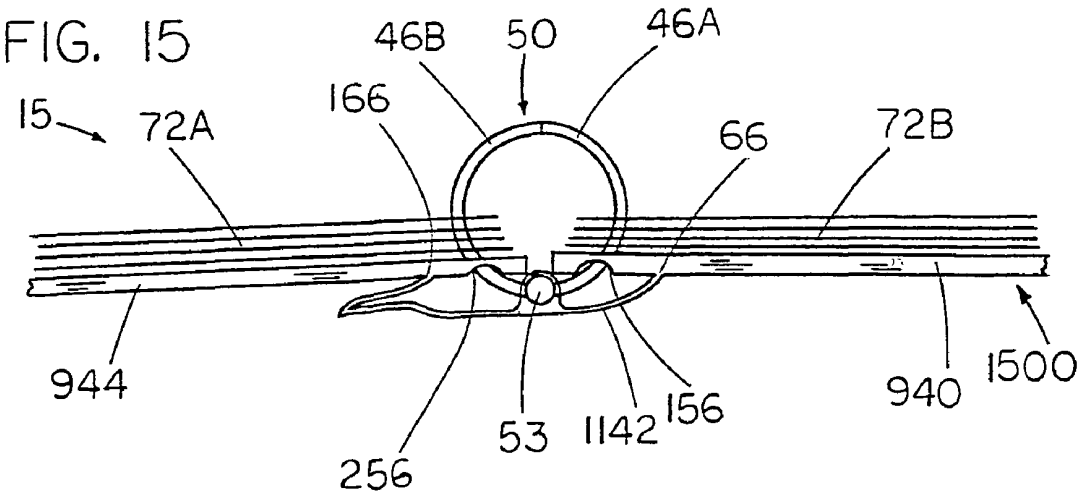
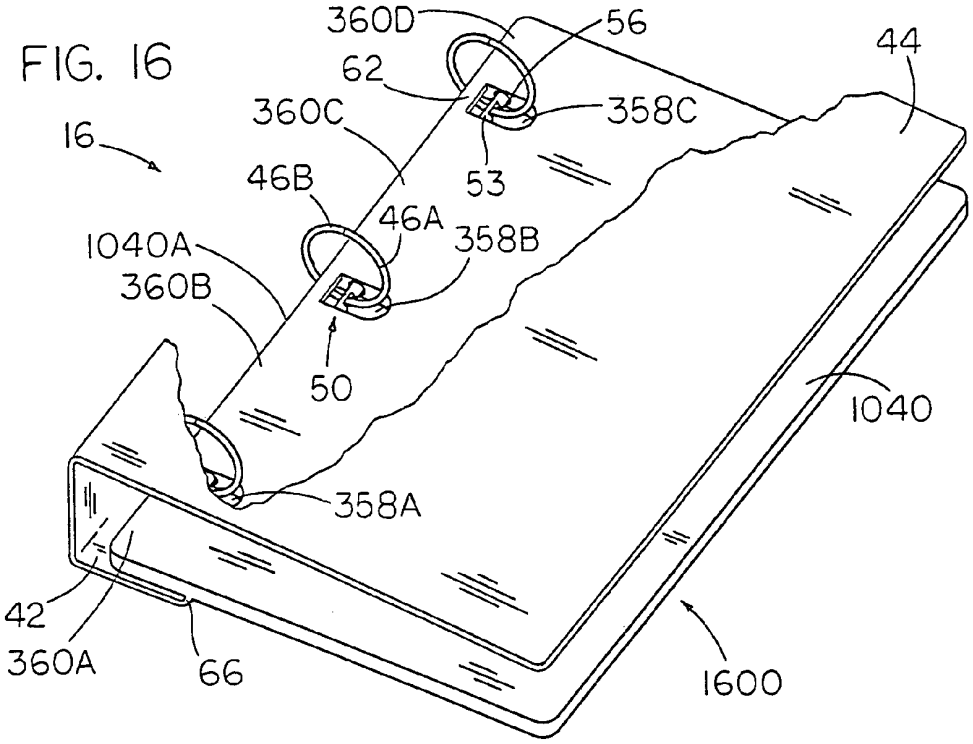


FIG. 16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360C
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46B
46A
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358B
360B
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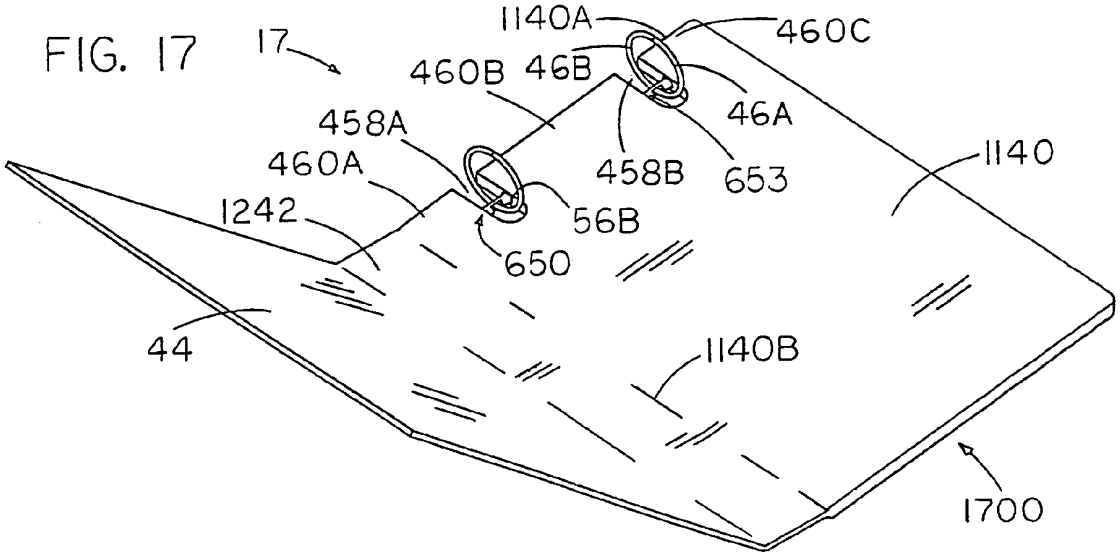
1040
358A
42
360A
66
1600

FIG. 17


17
1140A
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458A
460A
458B
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1242
56B
650
44
1140B
1700

FIG. 18A

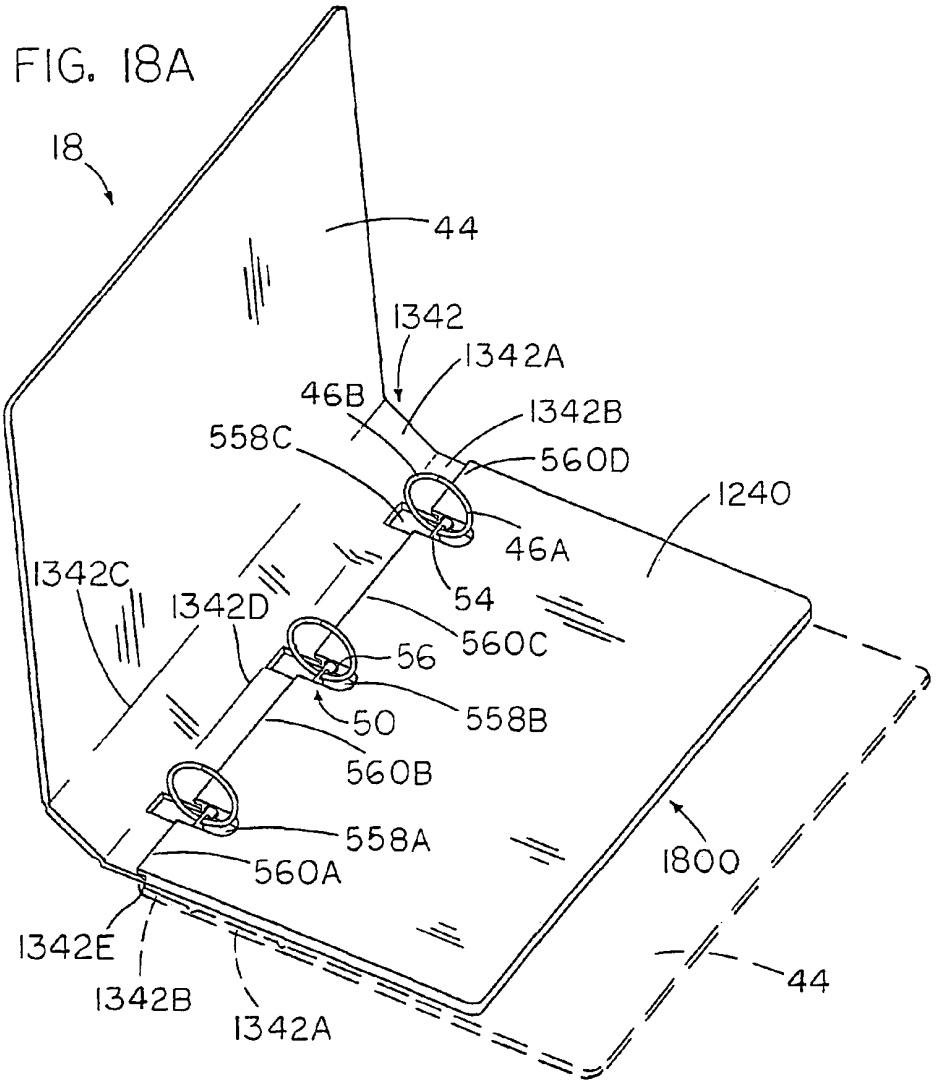


FIG. 18B

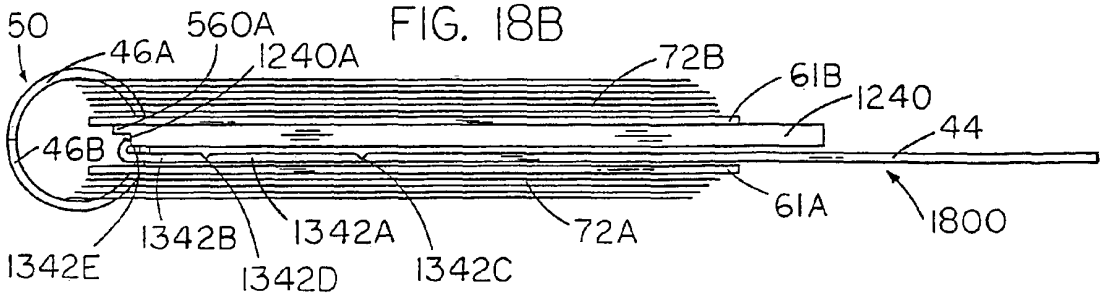


FIG. 19A

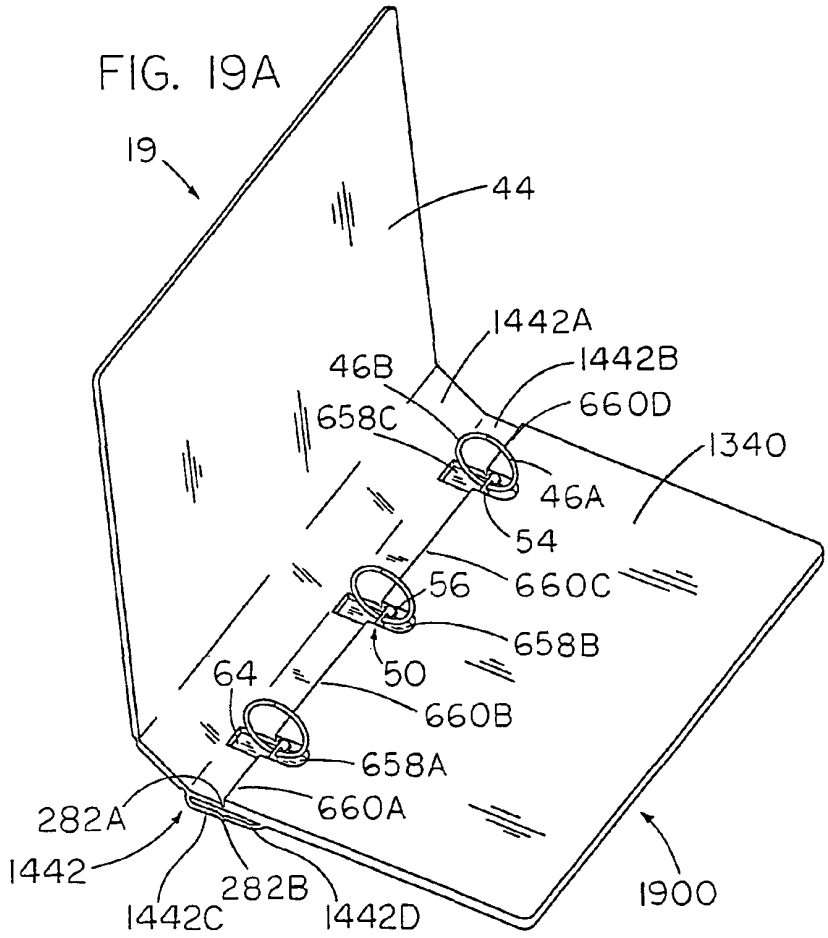


FIG. 19B

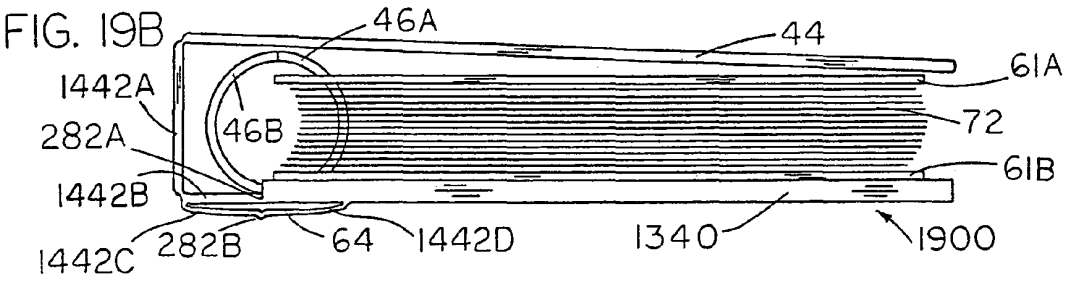


FIG. 19C

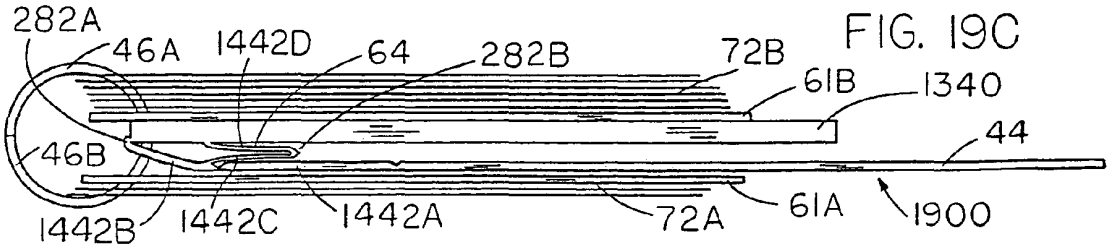


FIG. 20A

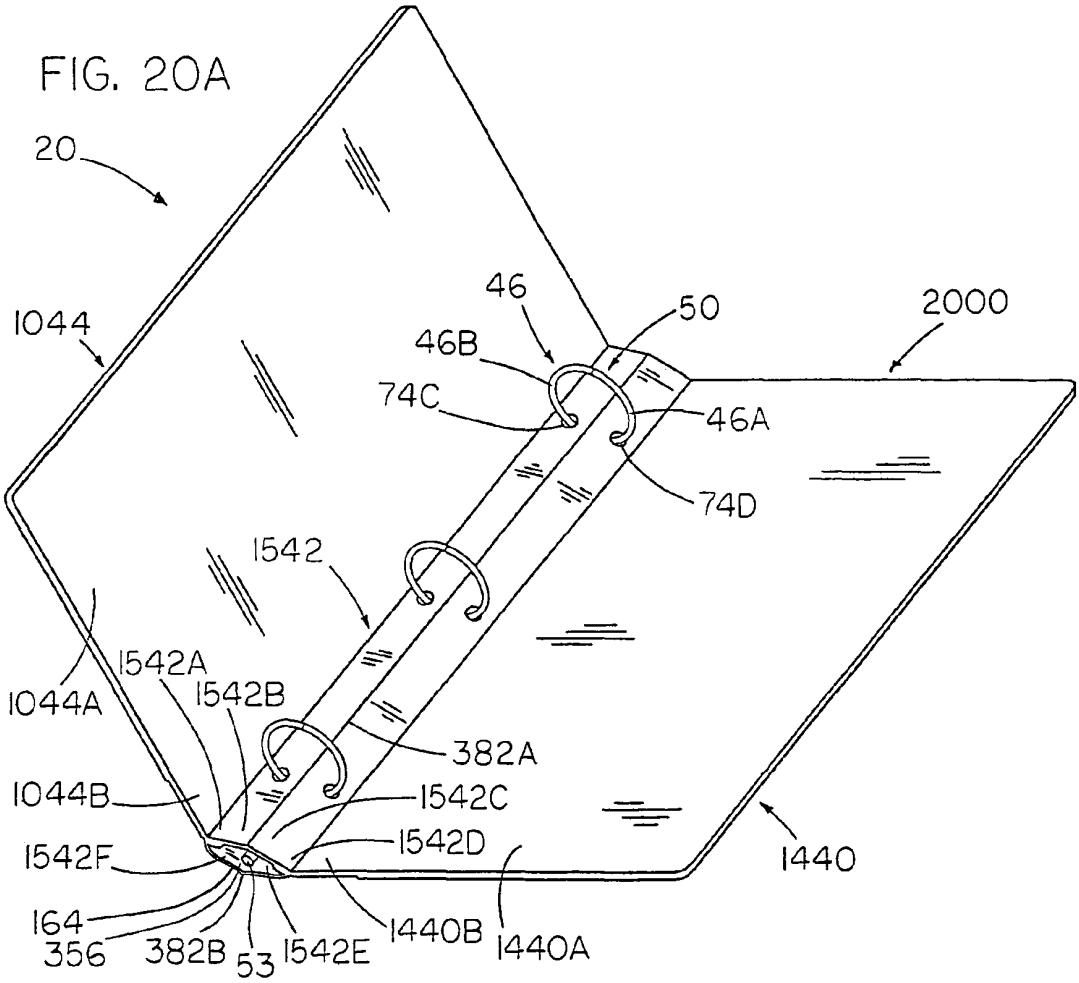


FIG. 20B

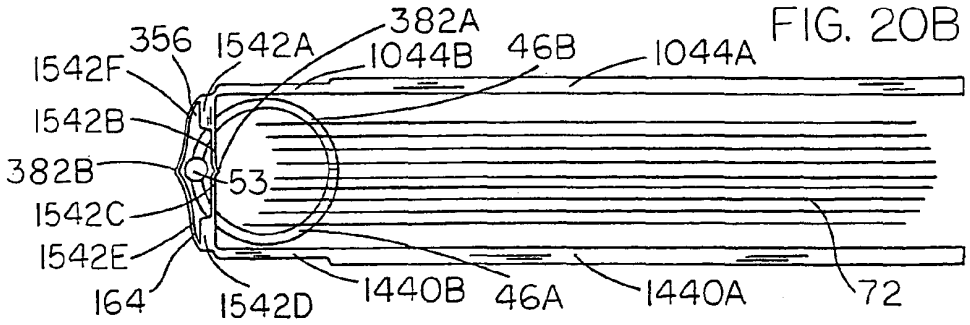
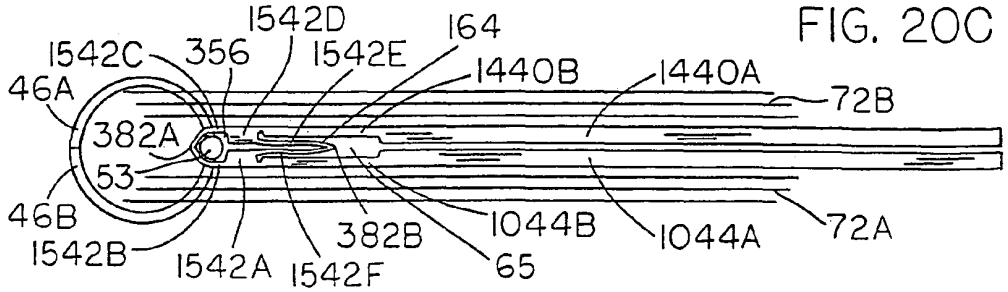


FIG. 20C



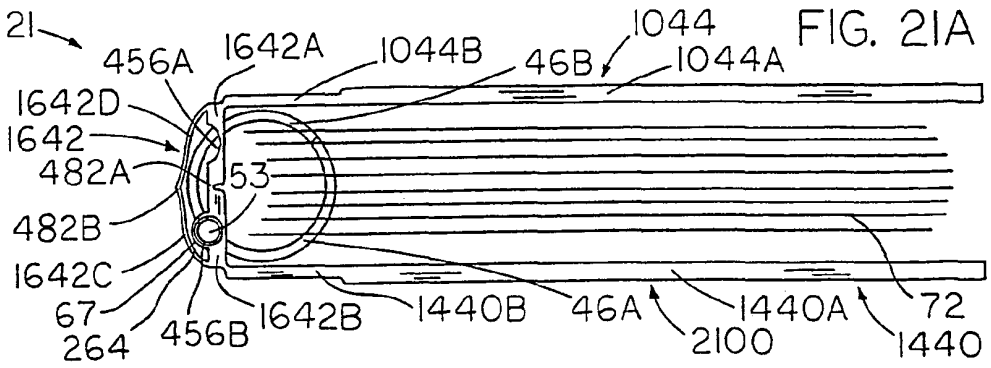


FIG. 21A

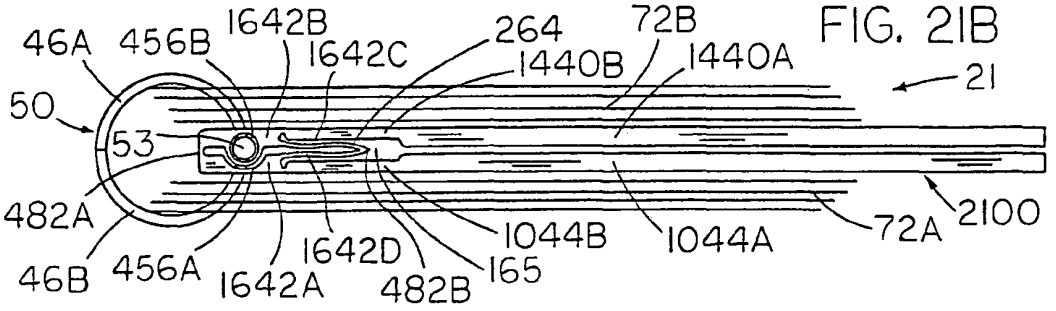


FIG. 21B

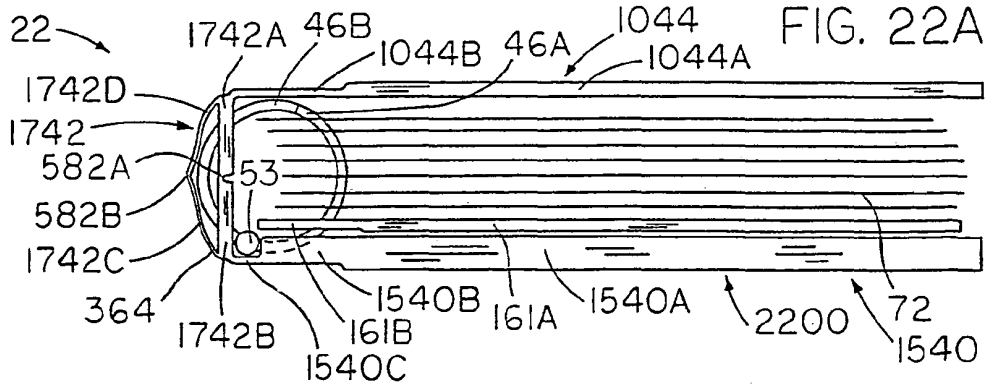


FIG. 22A

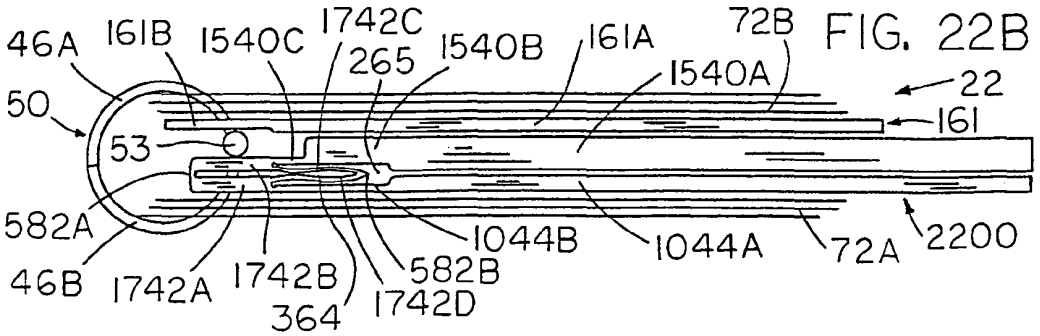


FIG. 22B

FIG. 23A

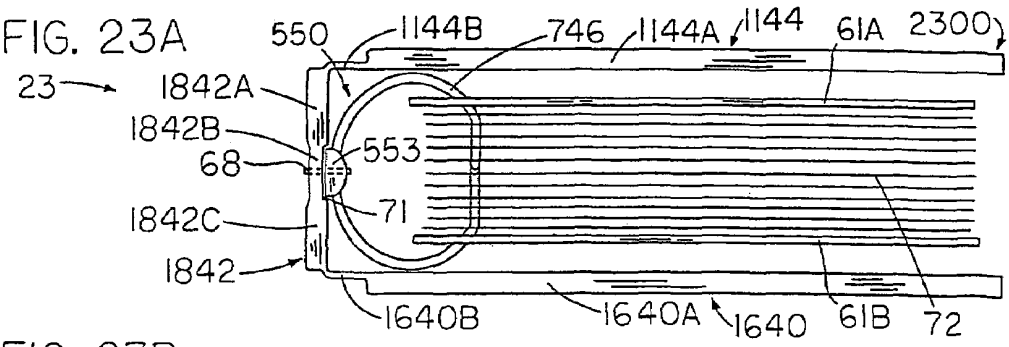


FIG. 23B

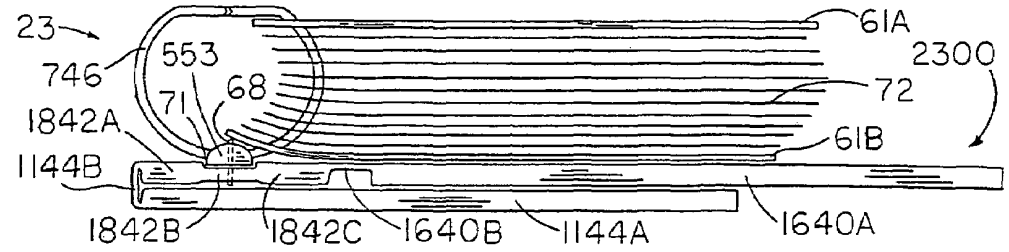


FIG. 23C

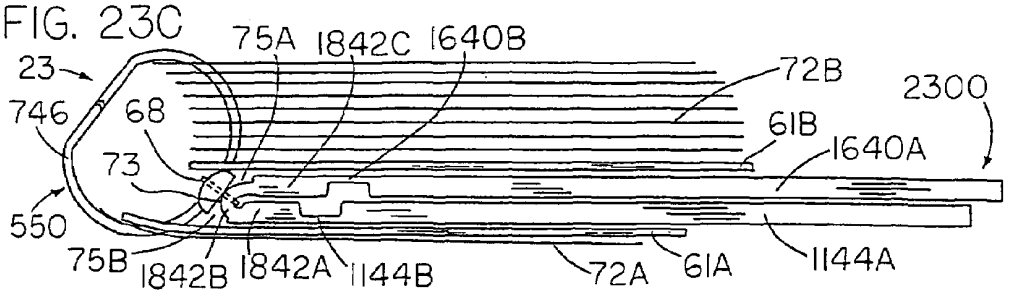


FIG. 23D

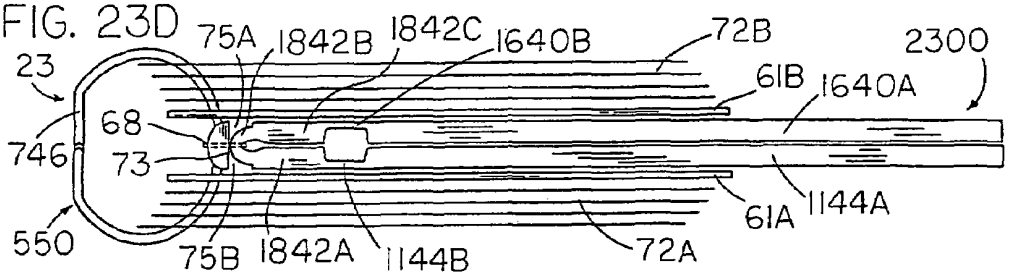


FIG. 23E

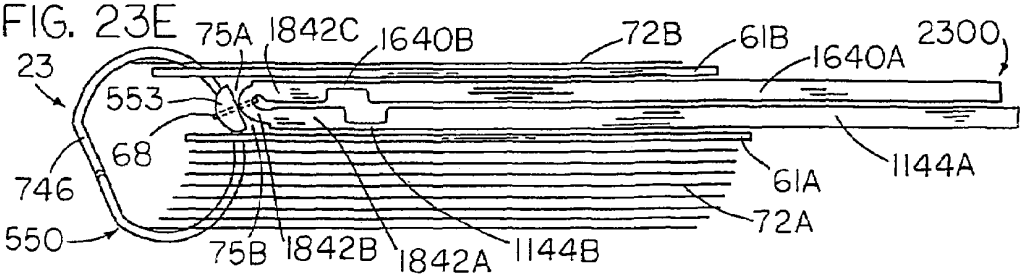


FIG. 24A

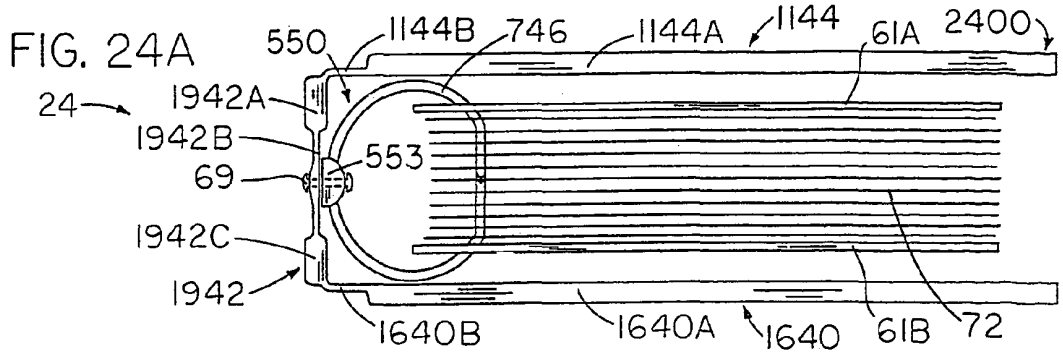


FIG. 24B

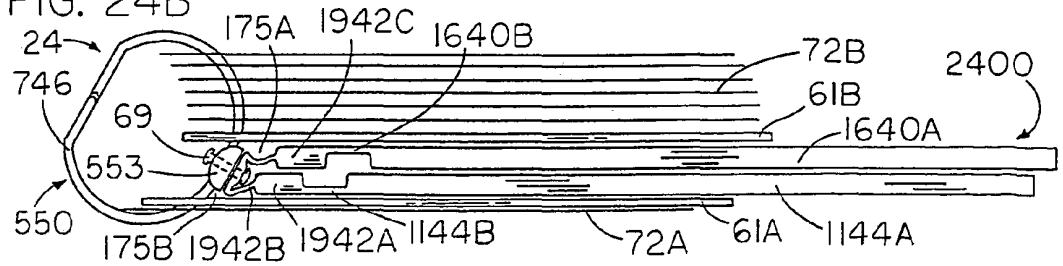


FIG. 24C

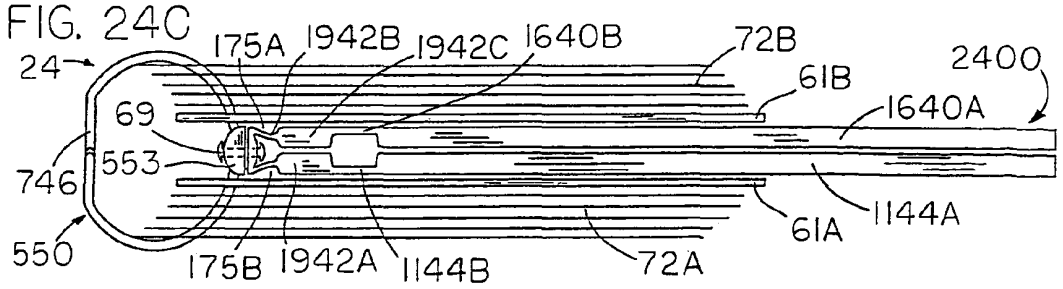


FIG. 25A

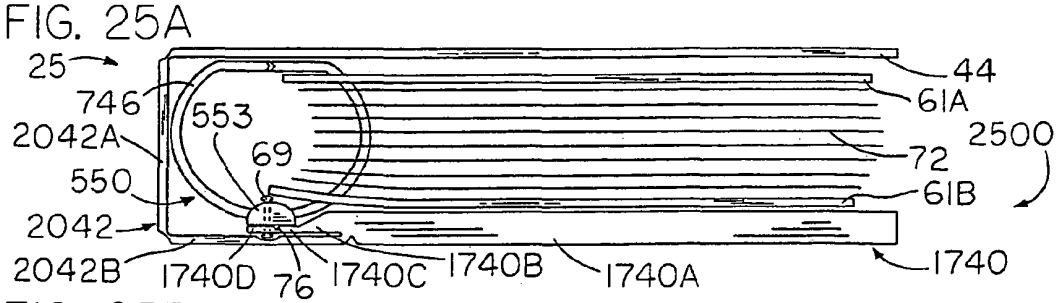
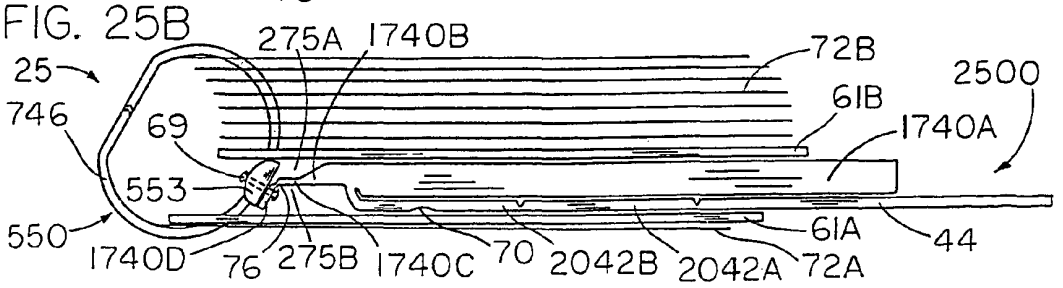


FIG. 25B



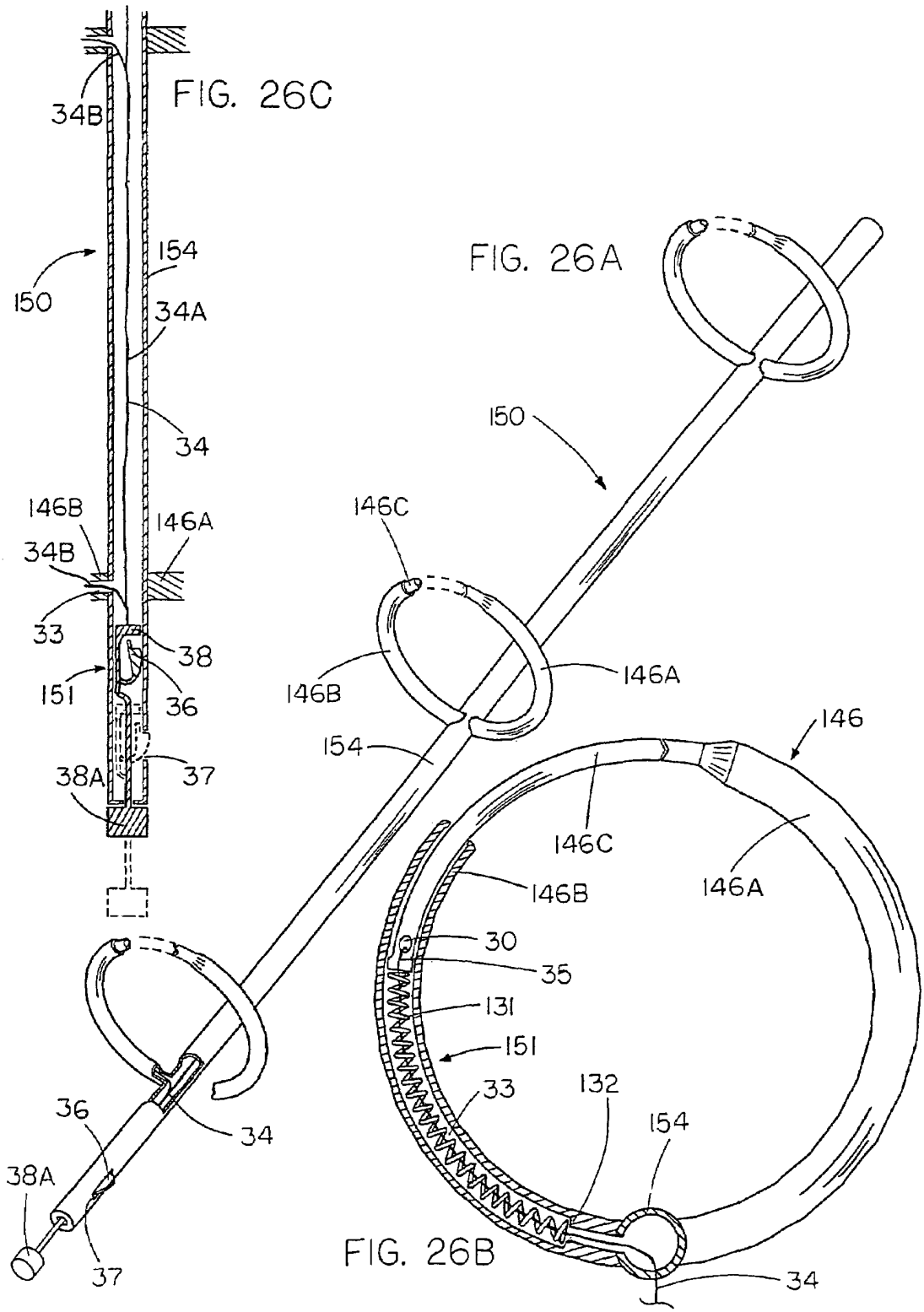


FIG. 26C
34B
154
150
34A
34
146B
146A
34B
33
38
151
36
38A
37
FIG. 26A
150
146C
146B
146A
154
146
146C
146B
146A
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131
151
33
132
154
34
36
38A
37
34
FIG. 26B

FIG. 27A

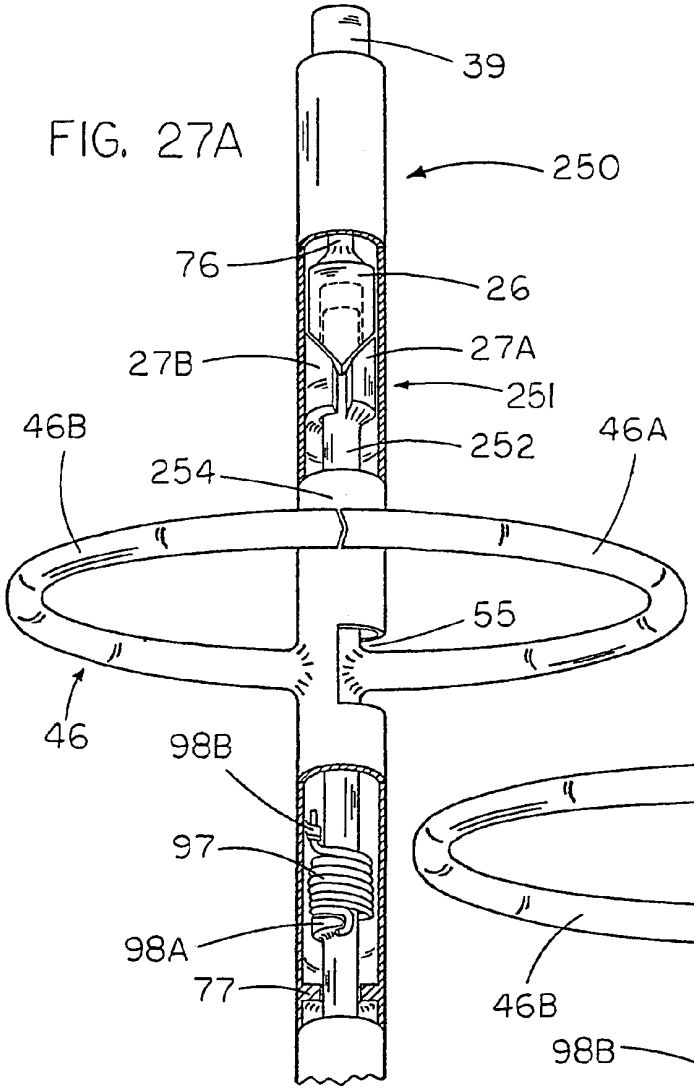


FIG. 27B

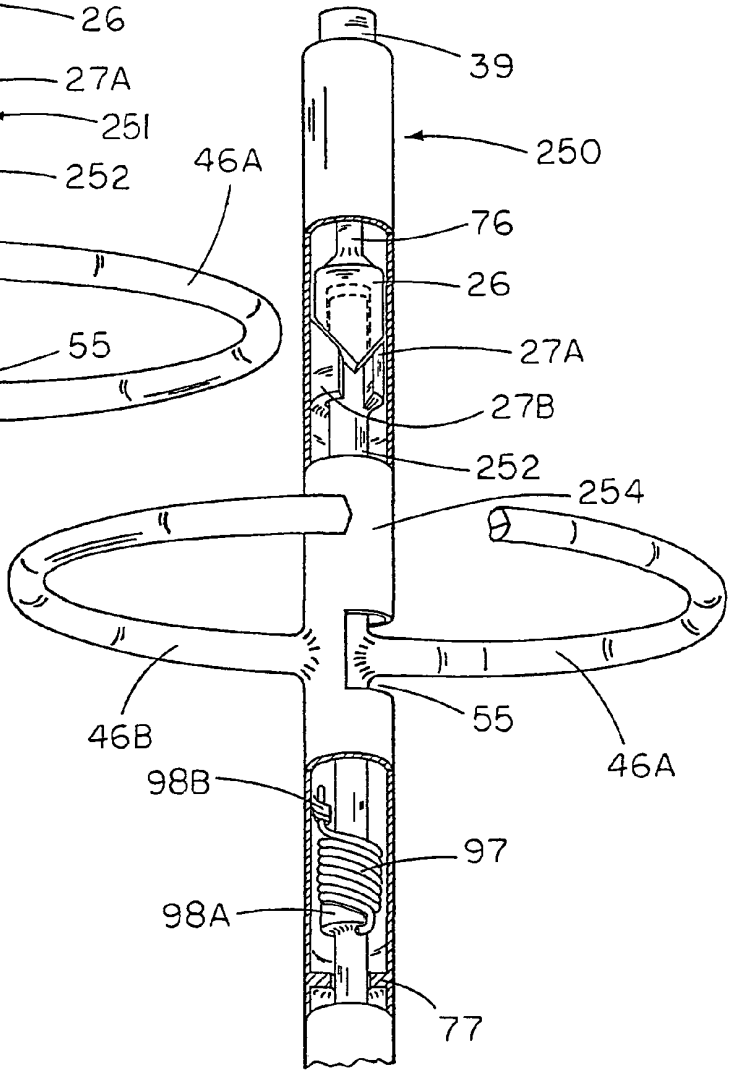


FIG. 28A

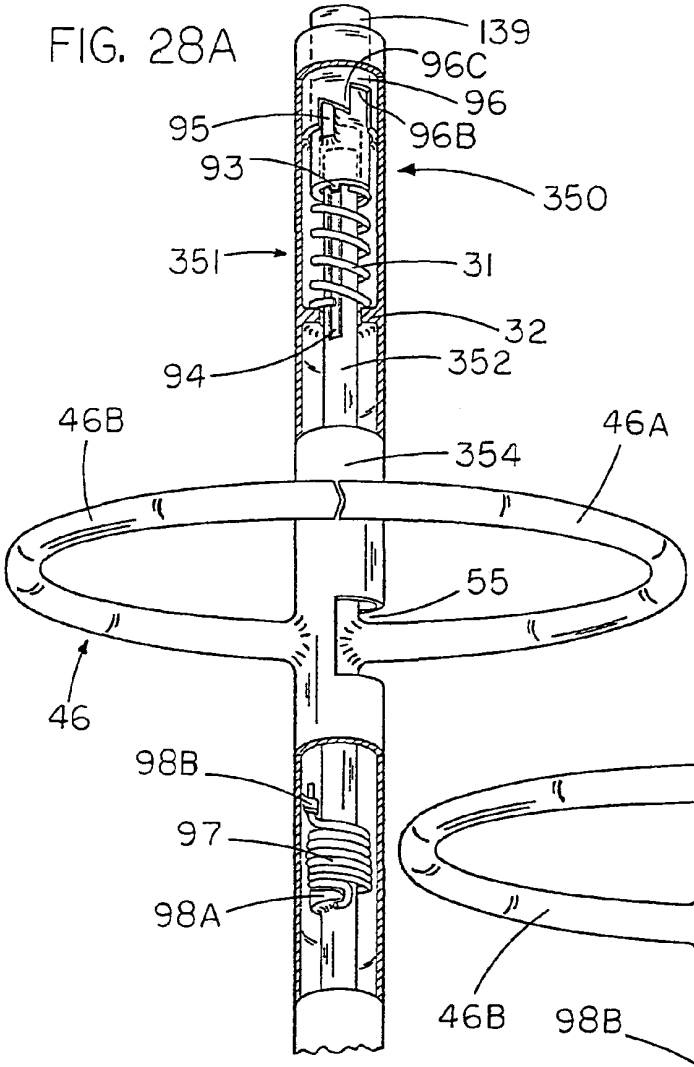


FIG. 28B

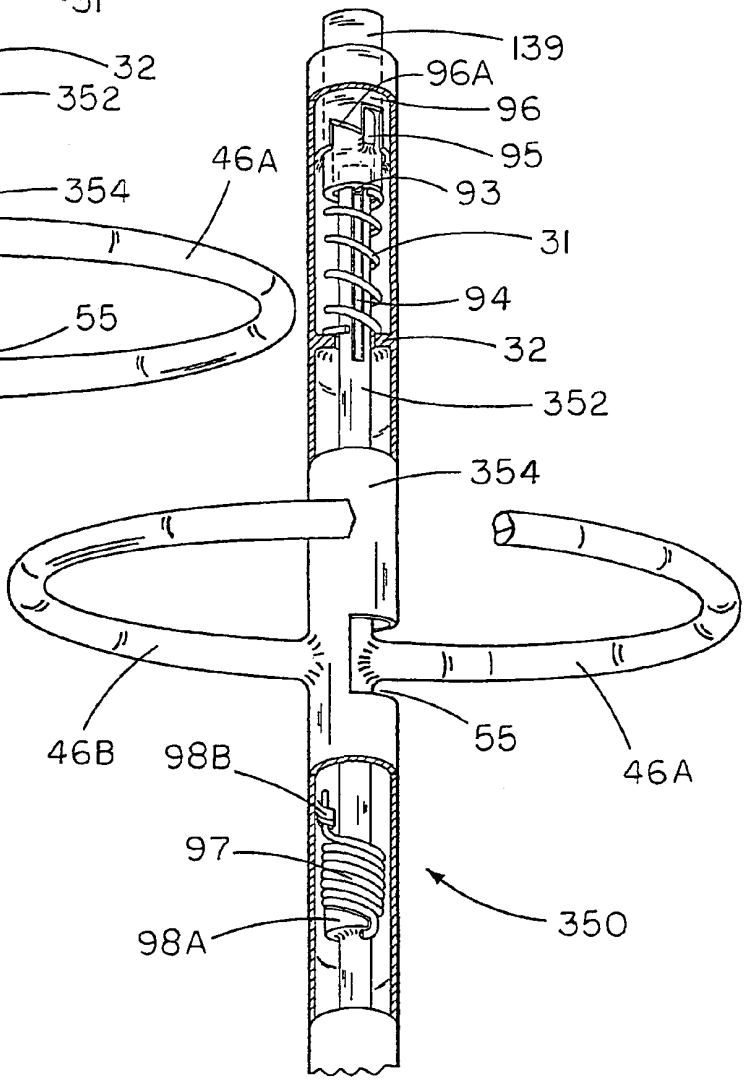


FIG. 29B

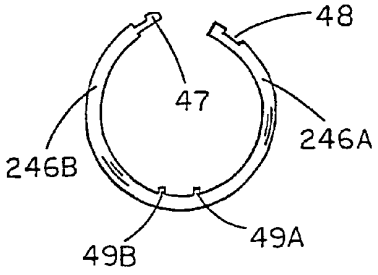


FIG. 29A

FIG. 29C

FIG. 30A

FIG. 31A

FIG. 32A

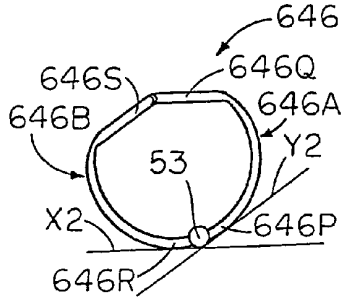


FIG. 33A

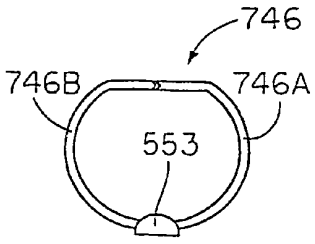


FIG. 34

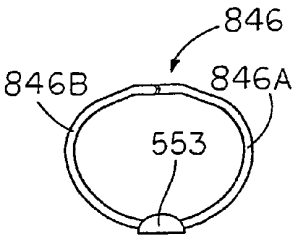


FIG. 35

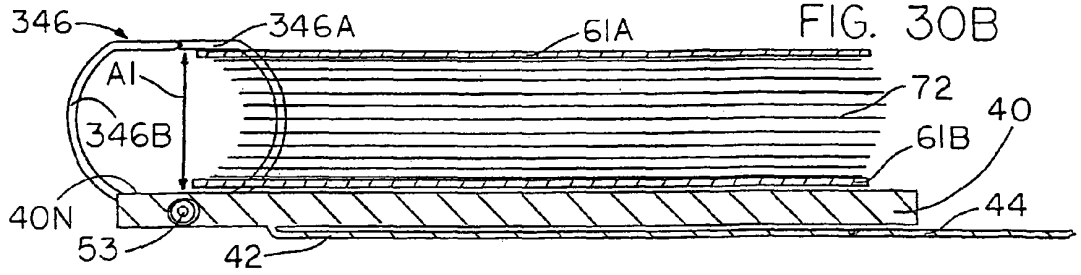


FIG. 30B

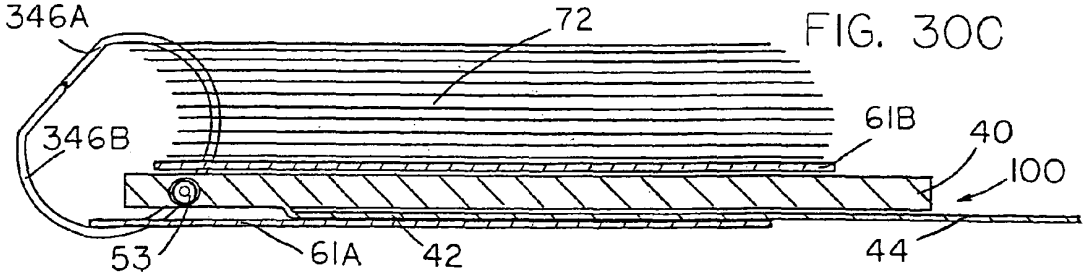


FIG. 30C

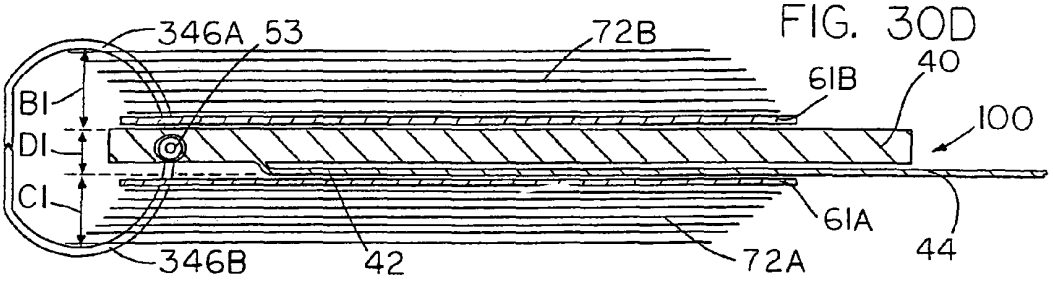


FIG. 30D

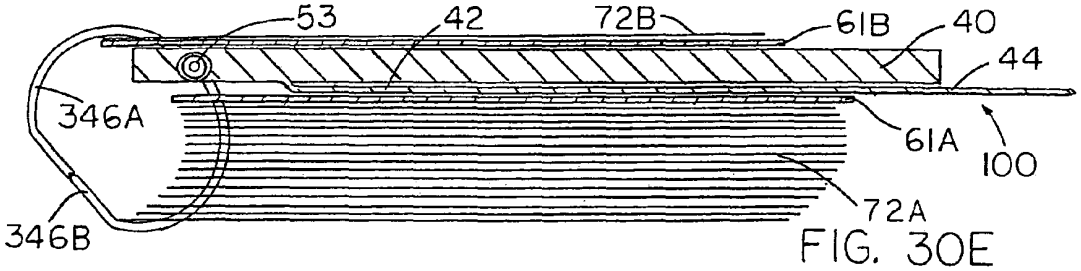


FIG. 30E

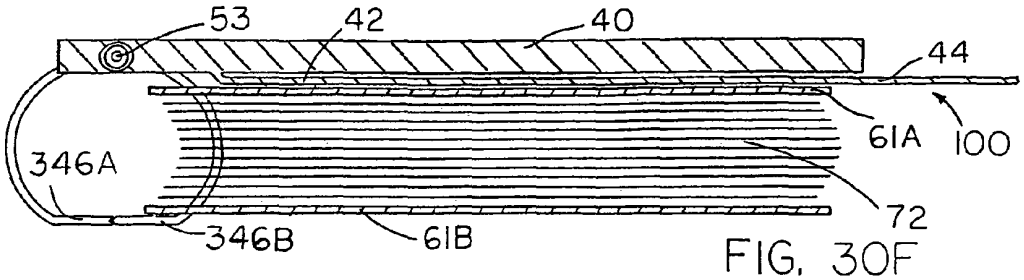


FIG. 30F

FIG. 31B

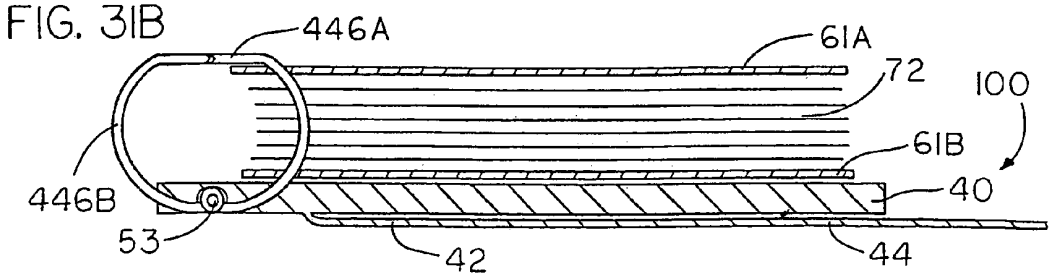


FIG. 31C

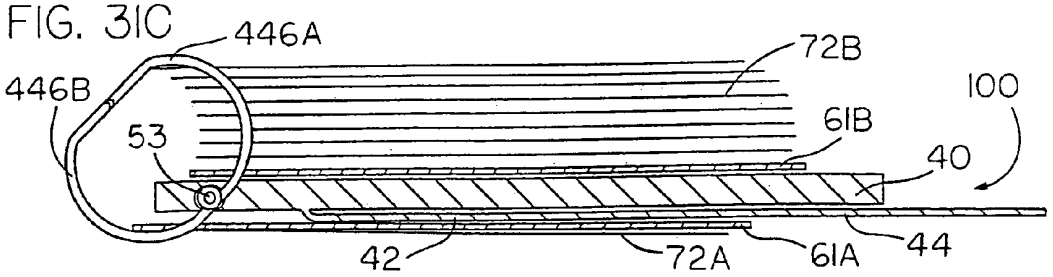


FIG. 31D

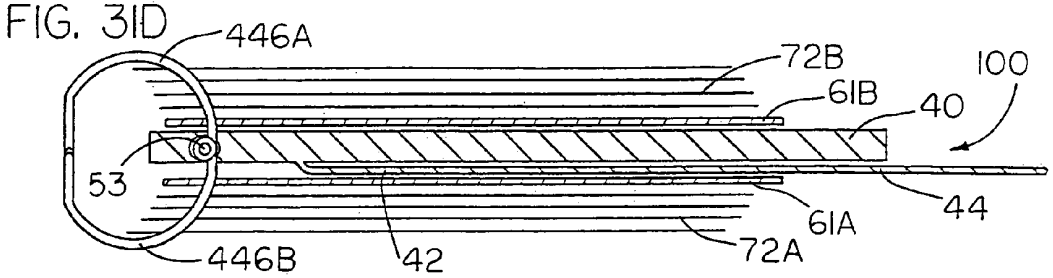


FIG. 31E

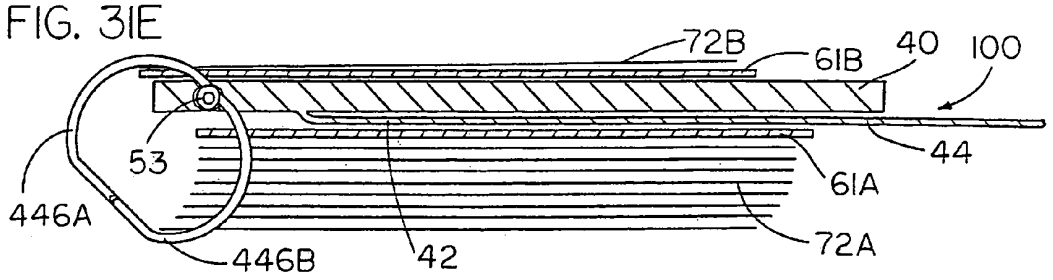


FIG. 31F

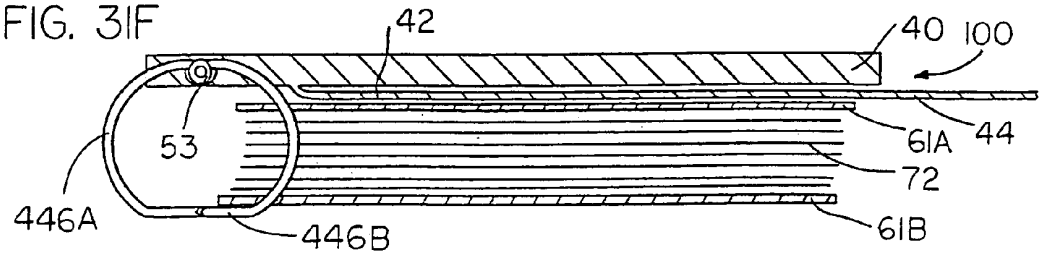


FIG. 32B

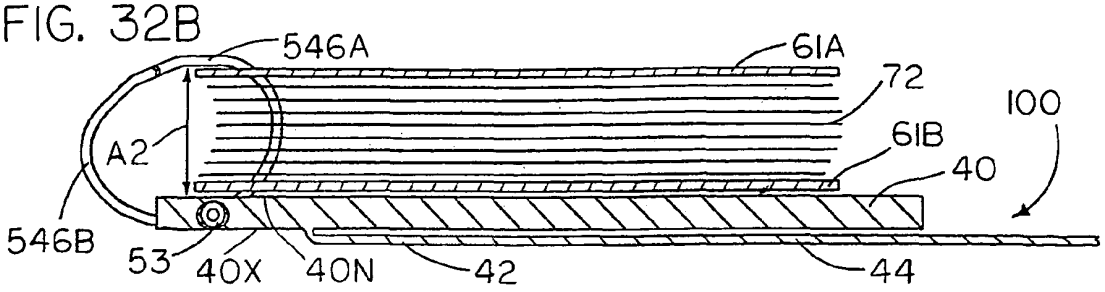


FIG. 32C

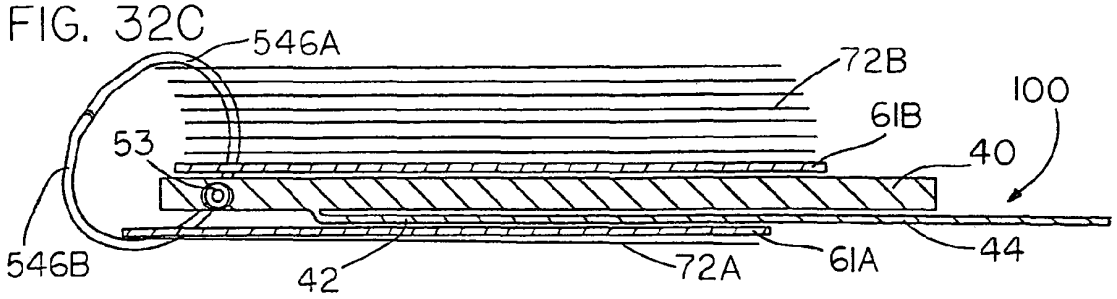


FIG. 32D

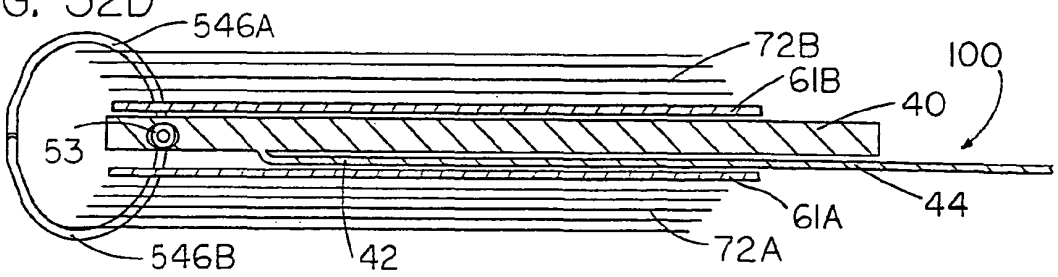


FIG. 32E

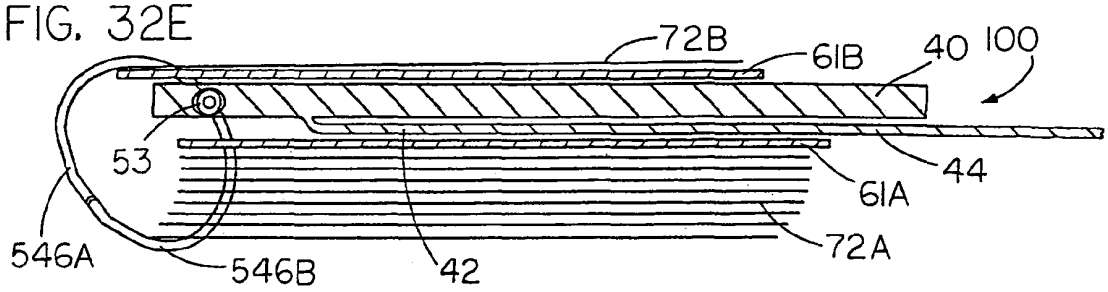


FIG. 32F

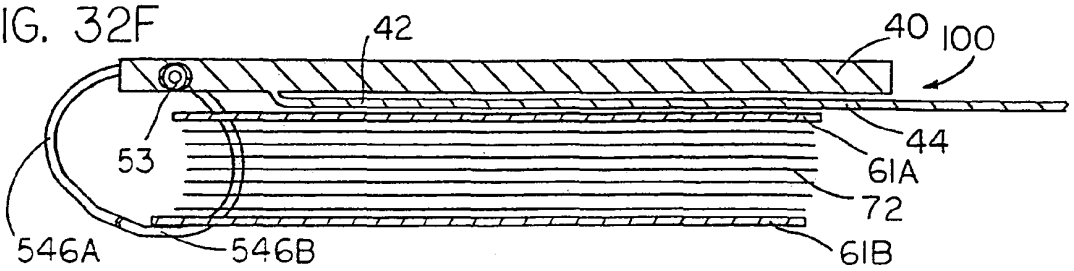


FIG. 33B

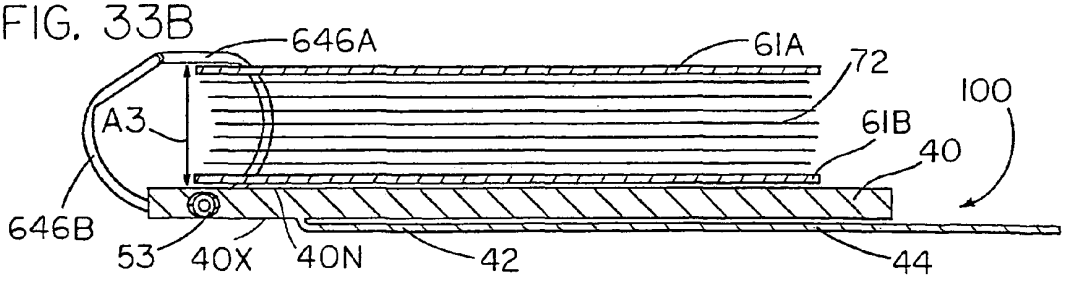


FIG. 33C

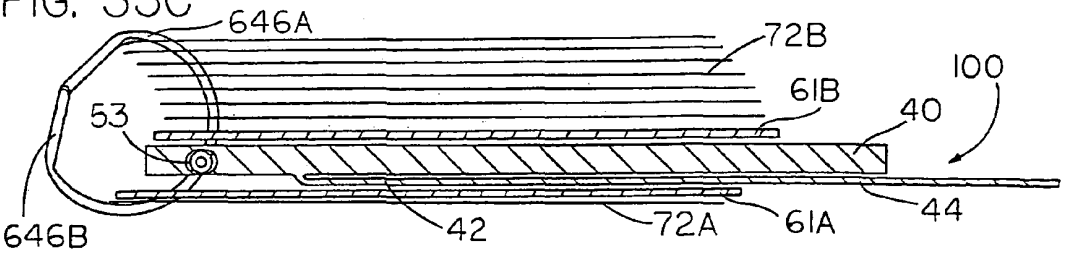


FIG. 33D

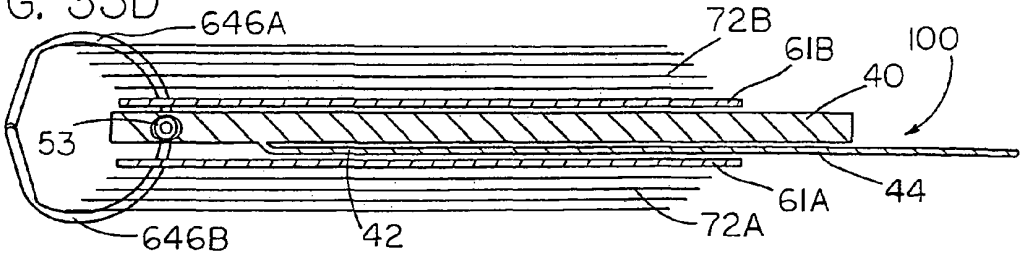


FIG. 33E

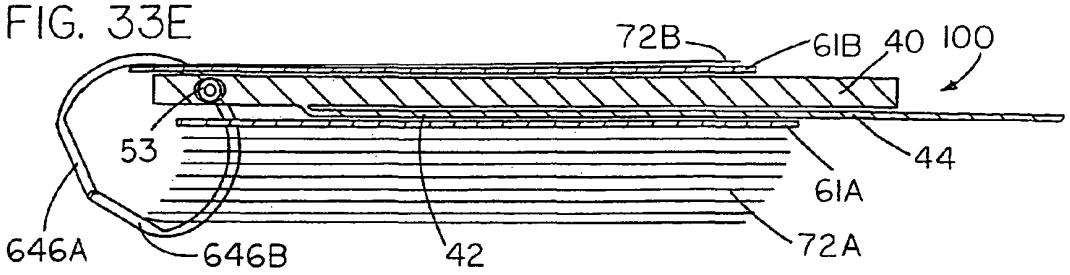
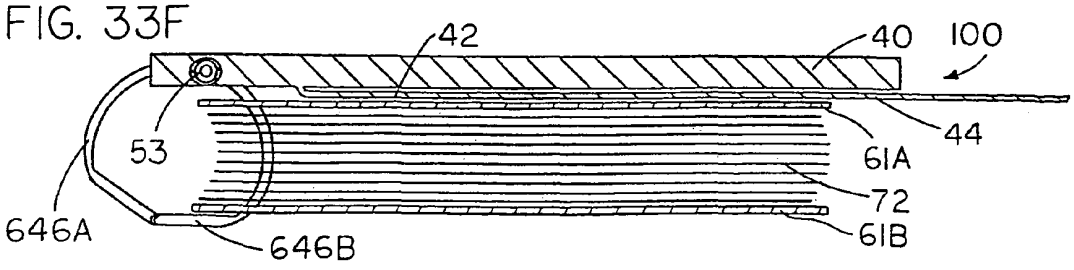


FIG. 33F



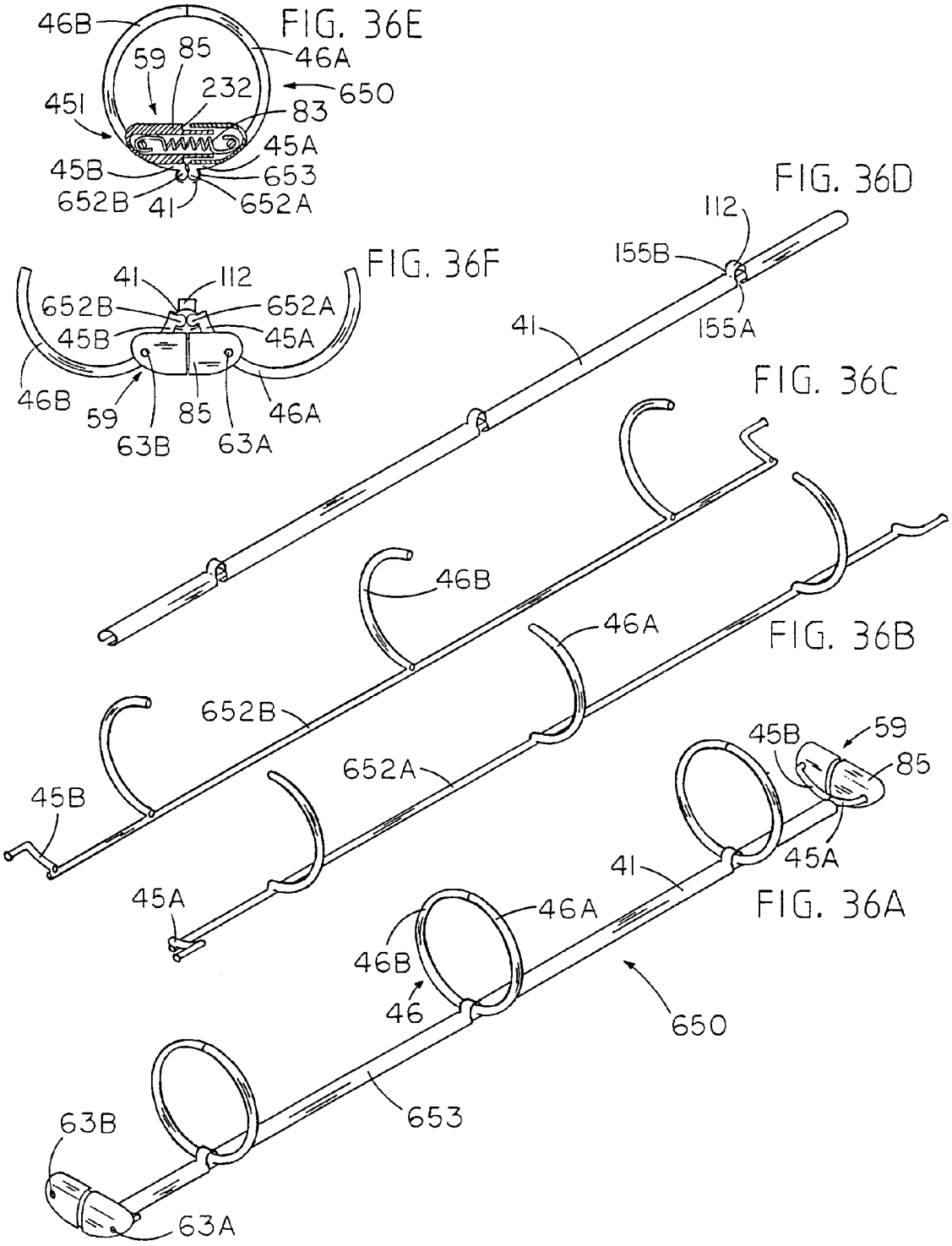


FIG. 36E
46B
59
85
46A
232
650
451
83
45A
45B
653
652B
41
652A
FIG. 36D
112
155B
155A
41
FIG. 36F
41
112
652B
652A
45B
45A
46B
59
85
46A
63B
63A
FIG. 36C
46B
46A
FIG. 36B
652B
652A
45B
45B
59
85
45A
41
45A
46A
FIG. 36A
46B
46
650
653
63B
63A

FIG. 37A

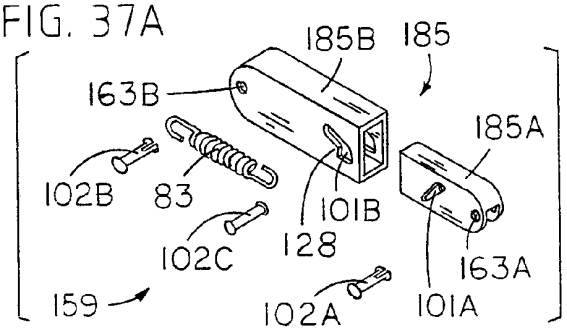


FIG. 37C

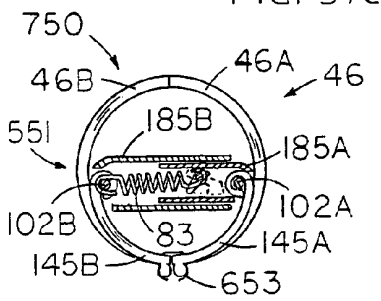
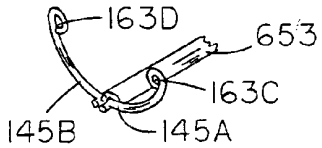


FIG. 37B



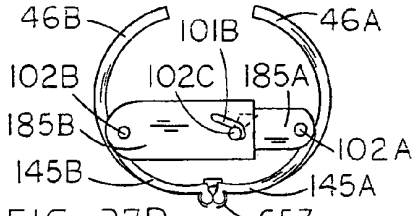
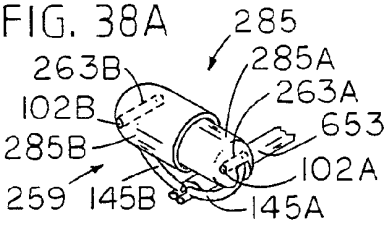


FIG. 37D

FIG. 38A



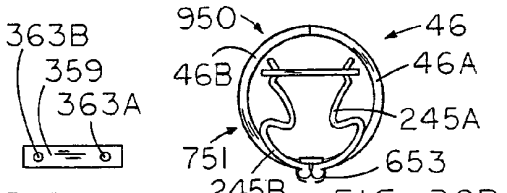


FIG. 39A FIG. 39B

FIG. 38B

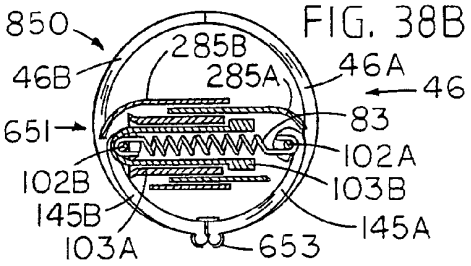
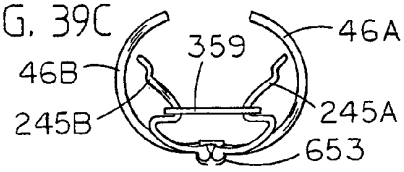


FIG. 39C



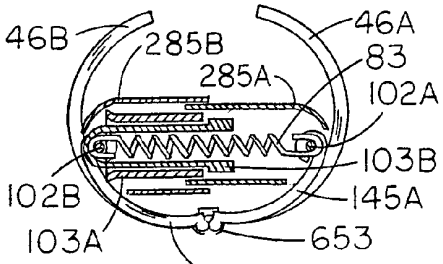


FIG. 38C

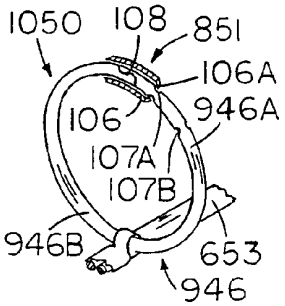


FIG. 40A

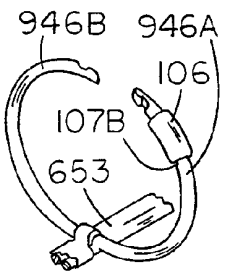


FIG. 40B

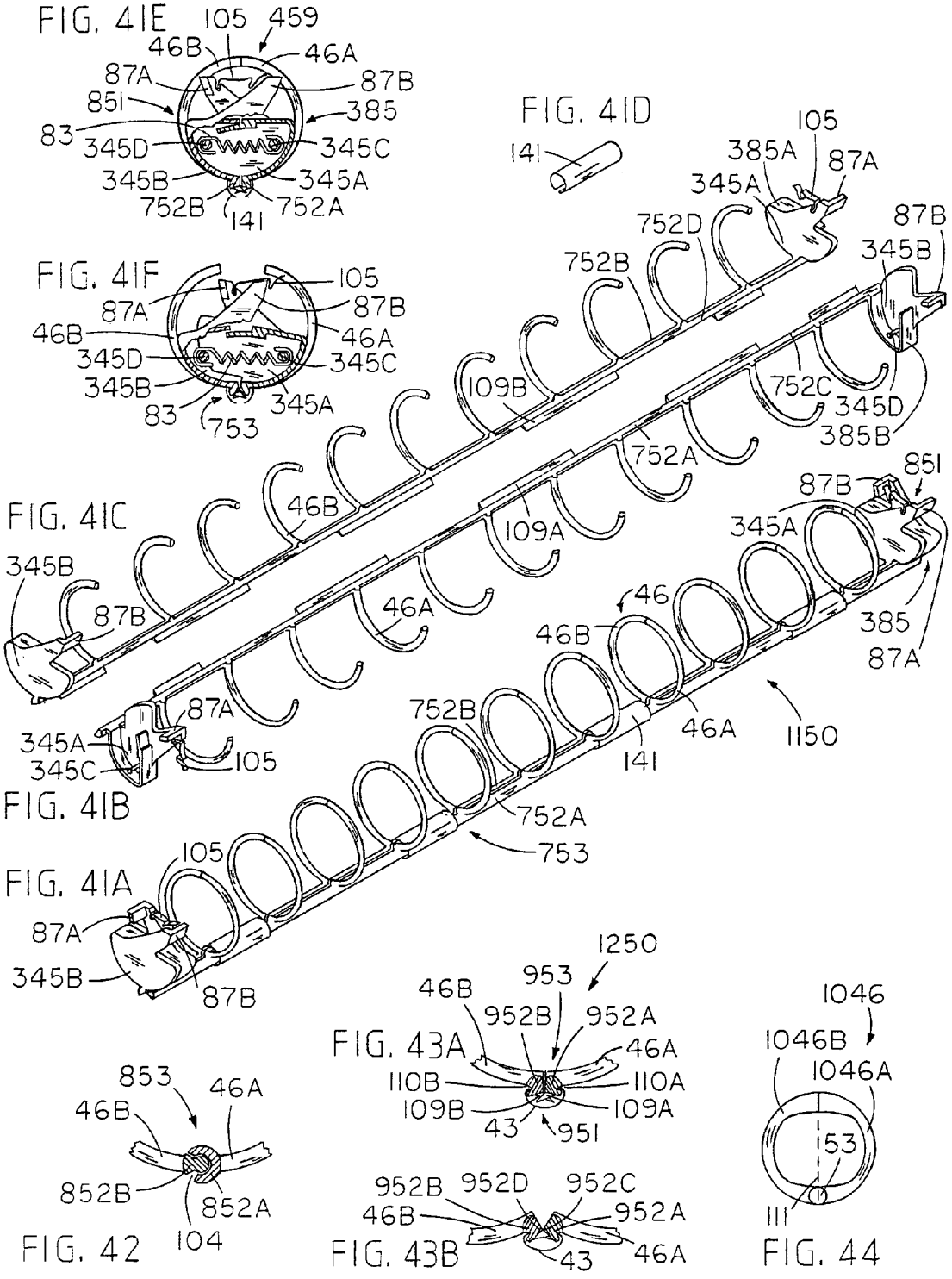


FIG. 41E
105
459
46B
46A
87A
87B
851
385
83
345D
345C
345B
345A
752B
141
752A
FIG. 41F
105
87A
87B
46B
46A
345D
345C
345B
345A
83
753
FIG. 41C
46B
109A
109B
752A
752B
752C
752D
345B
87B
46A
345A
385B
345D
87B
851
345A
385
87A
46
46B
FIG. 41B
87A
105
345A
345C
752B
752A
753
141
46A
1150
FIG. 41A
105
87A
345B
87B
FIG. 41D
141
105
385A
87A
345A
87B
345B
FIG. 43A
1250
953
46B
952B
952A
46A
110B
110A
109B
109A
43
951
FIG. 43B
952B
952D
952C
952A
46B
43
46A
FIG. 42
853
46A
46B
852B
852A
104
FIG. 44
1046
1046B
1046A
153
111

FIG. 45A

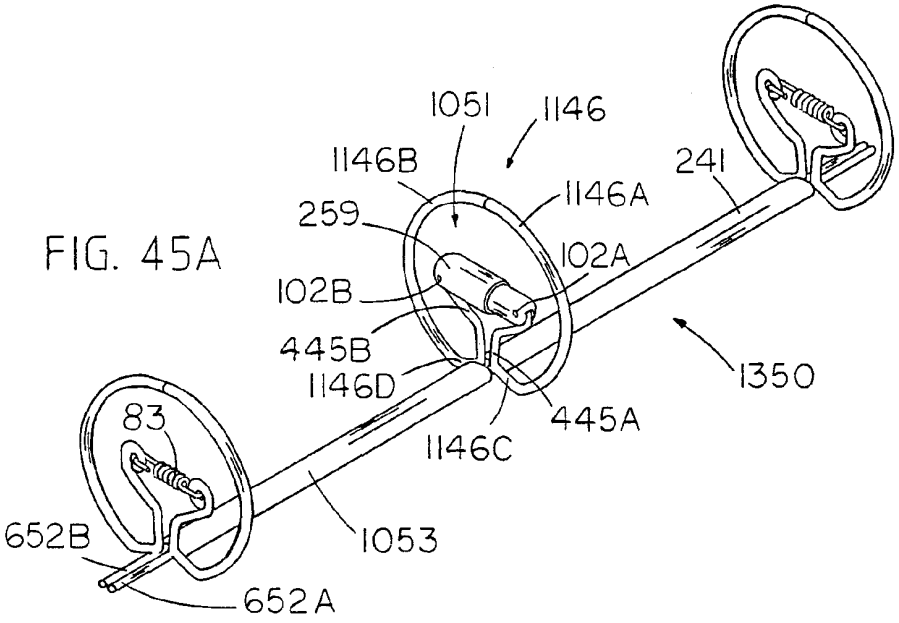


FIG. 45B

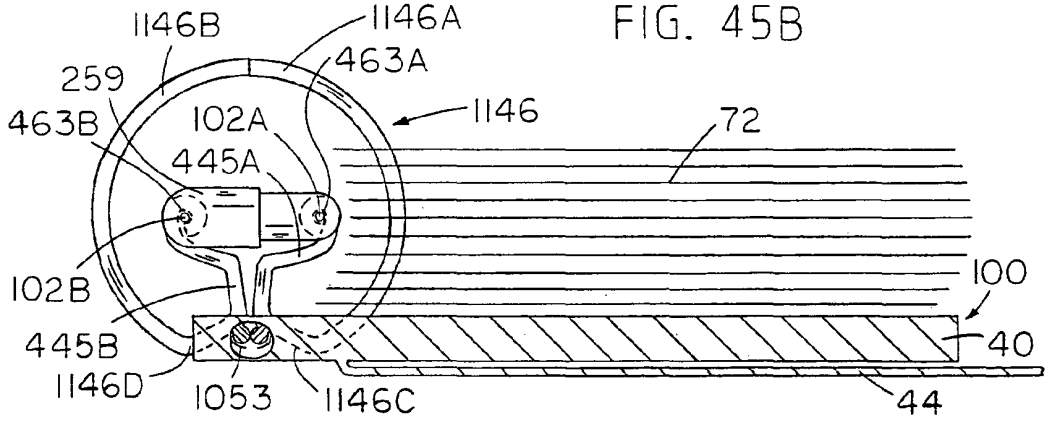


FIG. 45C

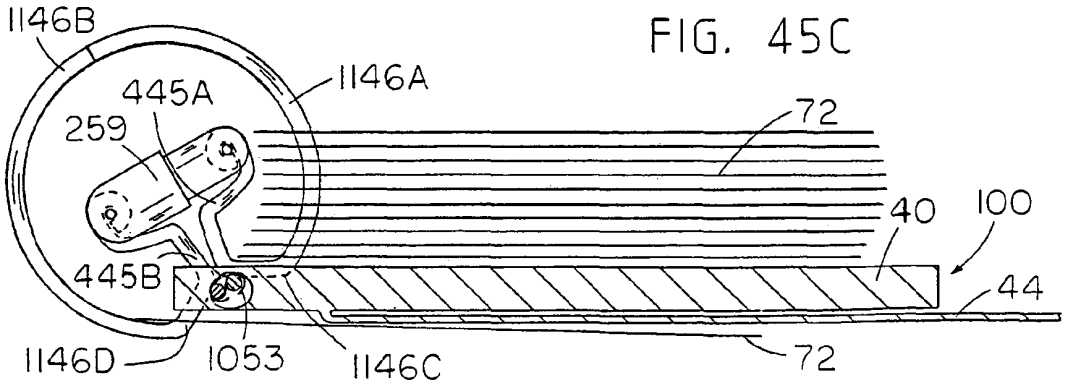


FIG. 46A

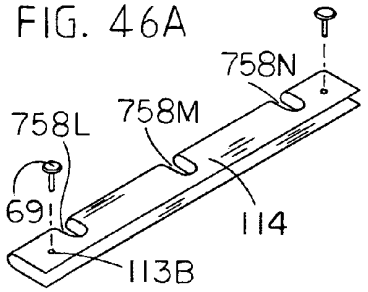


FIG. 46B

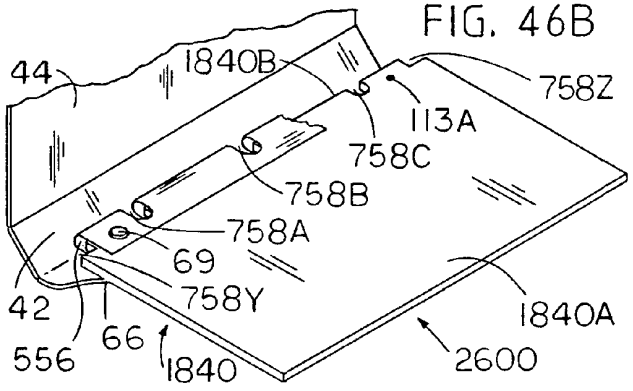


FIG. 47A

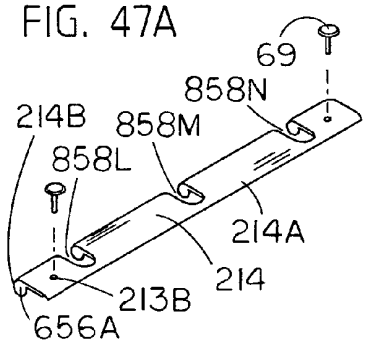


FIG. 47B

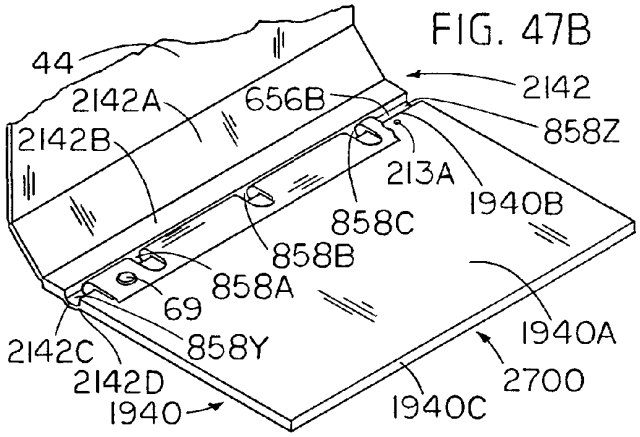


FIG. 48A

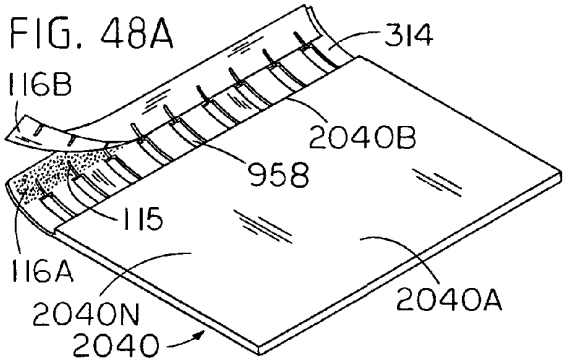


FIG. 48C

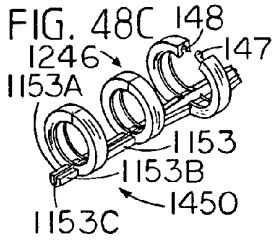
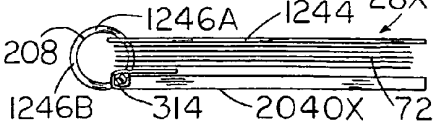


FIG. 48D

FIG. 48B



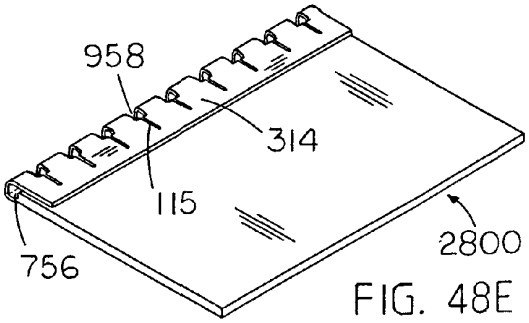
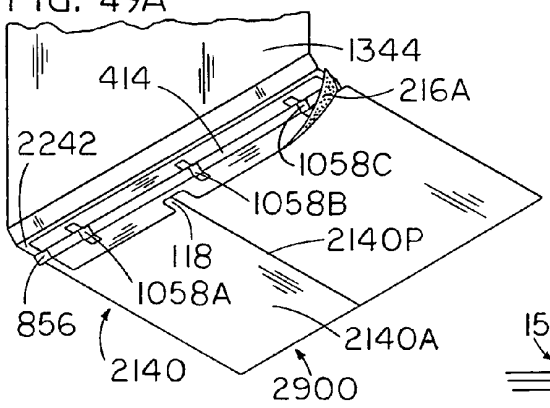


FIG. 48E

FIG. 49A



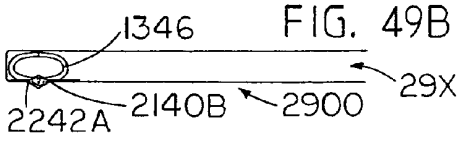


FIG. 49B

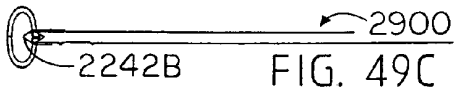


FIG. 49C

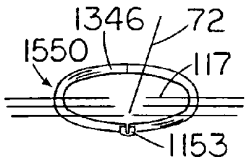


FIG. 49D

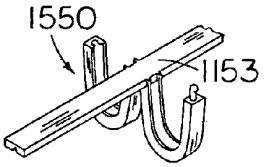


FIG. 49E

FIG. 50A

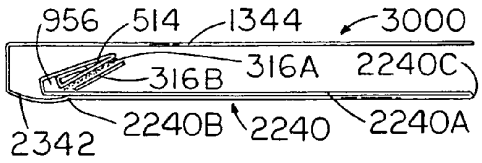
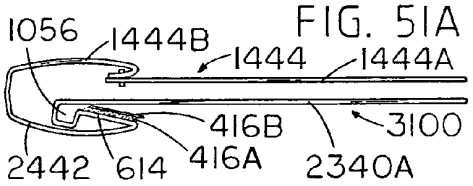


FIG. 51A



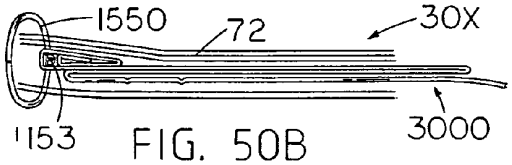


FIG. 50B

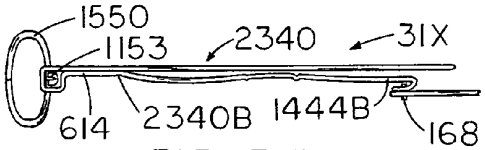


FIG. 51B

FIG. 52A

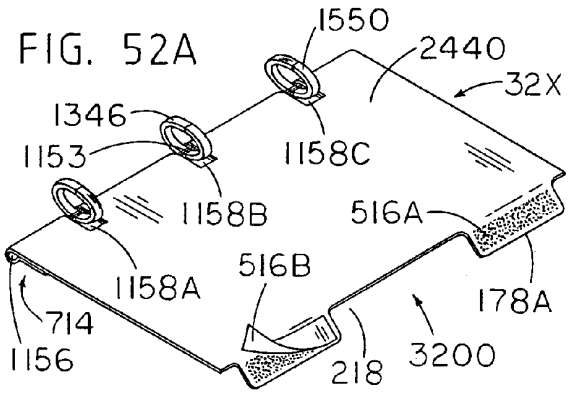
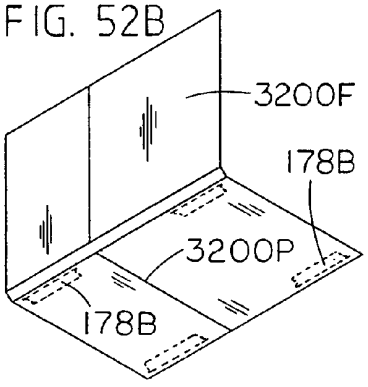


FIG. 52B



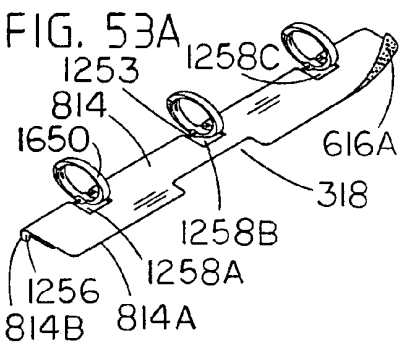


FIG. 53A

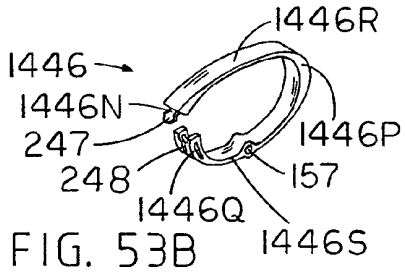


FIG. 53B

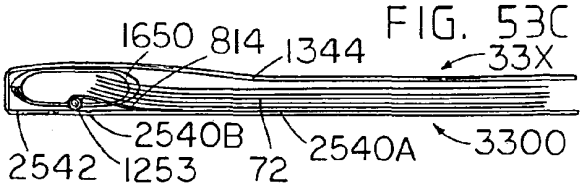


FIG. 53C

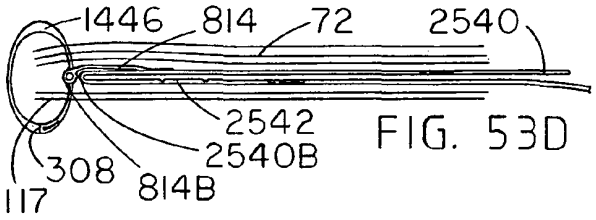


FIG. 53D

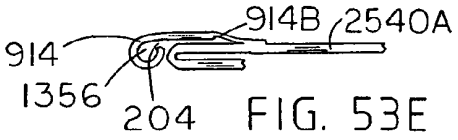


FIG. 53E

FIG. 54A

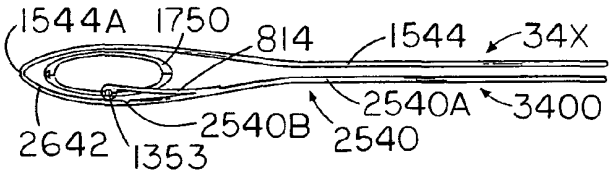
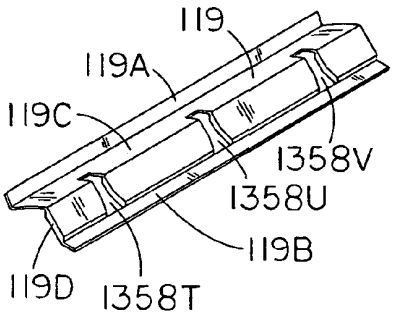


FIG. 54B



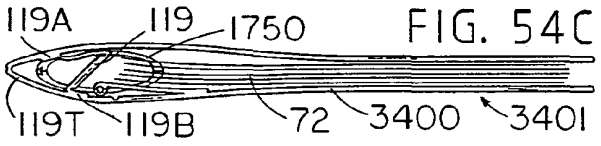


FIG. 54C

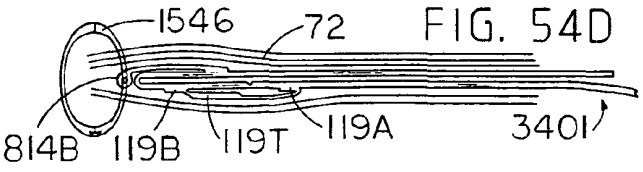


FIG. 54D

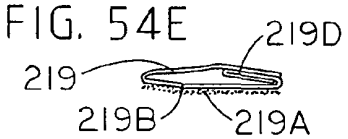


FIG. 54E

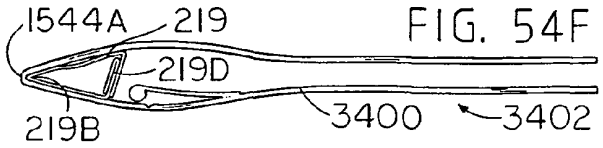


FIG. 54F

FIG. 54G

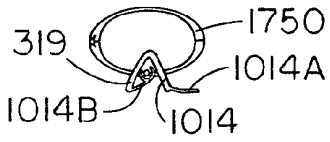


FIG. 54J

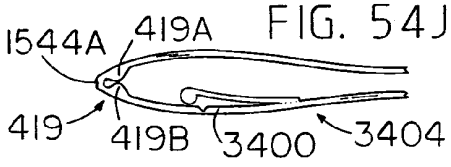


FIG. 54H

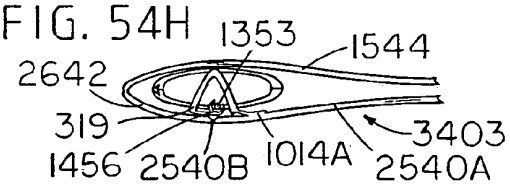


FIG. 54I

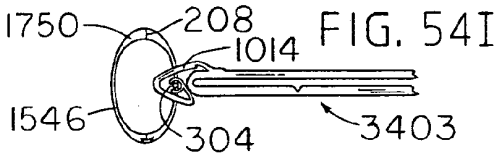


FIG. 51K

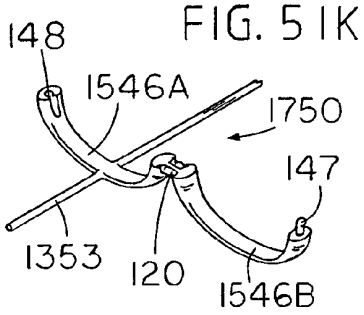


FIG. 55A

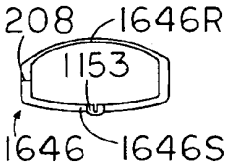


FIG. 56A

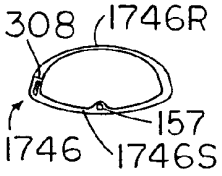


FIG. 57A

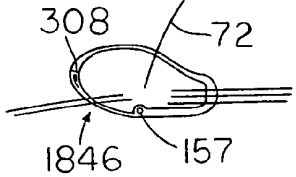
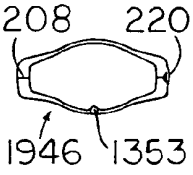


FIG. 58A



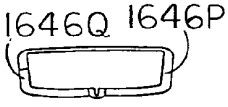


FIG. 55B

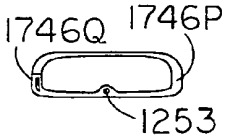


FIG. 56B

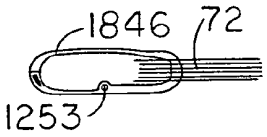


FIG. 57B

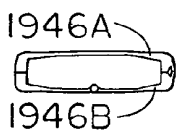


FIG. 58B

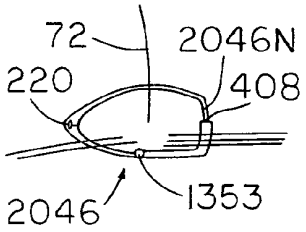


FIG. 59A

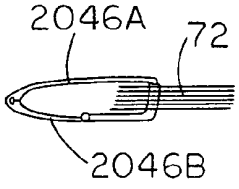


FIG. 59B

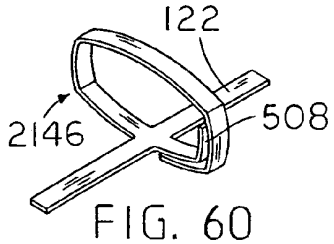


FIG. 60

LOOSE-LEAF BINDER

This is a continuation-in-part of prior application Ser. No. 10/123,000, filed Apr. 15, 2002 now U.S. Pat. No. 6,702,501, to which priority under 35 U.S.C. §120 is claimed.

FIELD OF INVENTION

This invention relates to loose-leaf binders and analogous products such as loose-leaf personal organizers, loose-leaf flip charts, loose-leaf writing pads and loose-leaf photo albums.

BACKGROUND

Binders generally are comprised of two high-level assemblies, a "skeleton" and cover. The skeleton, as used herein, refers to the chassis of the binder, including the rings, spine and possible actuators, but excluding the cover. The spine, as used herein, refers to the elongated portion of the skeleton on which the rings are mounted; the spine excludes the rings, any transversely protruding elements disposed at the longitudinal ends of the skeleton such as actuation levers or proximate to the attachment points of rings such as springs wrapped around ring bases, and transversely protruding elements which are not fixed to rotate with the elongated portion such as a cover-attachment fastener wrapped about and rotatable about the elongated portion.

One object of loose-leaf binders, which is related to both the skeleton and the cover, is minimization of the "footprint" of the binder. The footprint of a binder is the area that is covered by any part of the binder when the binder is placed upon a generally flat surface. Minimizing a binder's footprint during use efficiently utilizes desk, table, or lap space.

A substitute product, the spiral notebook, specifically addresses this object by letting users flip the front cover and forward pages perfectly flat beneath the back cover and latter pages. However, spiral notebooks do not permit the easy addition or removal of pages.

Conventional loose-leaf binders have a very large footprint because, during use, the front cover is open 180 degrees relative to the back cover. This large footprint causes these binders to be cumbersome during use. Furthermore, if the front cover and forward loose-leaves are flipped behind the back cover and latter loose-leaves of a conventional binder, the forward and latter loose-leaves do not lie flat against the front and back covers, respectively. Large stress is exerted on some loose-leaves causing them to tear out of the binder and the airfoil shape of the stack of forward loose-leaves, front cover, back cover, and latter loose-leaves does not provide a flat writing surface. Furthermore in this case, writing on the topmost loose-leaf is difficult as the stack of loose-leaves bends and springs back under the shifting weight of a writing hand and wrist.

In the prior art, there have been attempts to minimize the footprints of loose-leaf binders during use while eliminating the problems mentioned above for conventional binders. However, each of these attempts has had some failing including: (1) sacrifice of a desired feature, (2) only partial achievement of this functionality, and (3) addition of undesirable characteristics.

The failings of known loose-leaf binders to minimize binder footprints are principally the result of (1) the large transverse cross-section dimensions of spines of known skeletons, (2) the methods employed to attach covers to skeletons, and (3) the design of the covers.

The first main cause of these failings, the large transverse cross-section dimensions of loose-leaf binder skeleton spines, has generally resulted from a common objective of skeletons, the ability to simultaneously open and close all rings of a skeleton via a simple actuation mechanism. SOCRA, which is used herein to describe these skeletons, is an acronym for Simultaneously Openable/Closeable Rings Actuation.

Conventional loose-leaf binders have SOCRA skeletons with spines having transverse cross-sections with major and minor dimensions wherein the large major dimension is built into the perimeter of the rings whereas the minor dimension is substantially radial to the center of the rings. Binder skeleton spines have traditionally had a transverse cross-section with a ratio of major to minor dimensions greater than two.

Conventional loose-leaf binders have a front cover attached to a middle cover which in turn is attached to a back cover. The SOCRA skeleton is rigidly fixed to the middle cover or back cover via rivets.

Exemplary dimensions of conventional loose-leaf binder covers in the market are as follows:

Front and Back Cover Thickness	Middle cover Thickness
2 mm	2 mm
3 mm	4.5 mm
4 mm	5 mm

Typical dimensions of conventional loose-leaf binder skeletons in the market are as follows:

Ring Outer Diameter	Ring Prong Thickness	Skeleton Spine Width
13.5 mm	1 mm	10 mm
21 mm	2 mm	16 mm
32 mm	2.8 mm	25 mm
75 mm	3.5 mm	50 mm

A ring outer diameter differs from its corresponding ring inner diameter by two ring prong thicknesses. Skeleton spine width is the major transverse cross-section dimension of a binder skeleton spine. The widths of skeleton spines are affected and constrained by the SOCRA mechanism employed and ring prong thickness. Note that as ring size increases, prong thickness increases to handle the stronger forces acting on the rings. Because ring prongs are commonly riveted into plates in conventional skeletons, as ring prongs increase in thickness, the skeleton spine width also must increase to secure the thicker prongs. The smallest conventional binders in the market which are small pocket binders have skeleton spine widths that are still 10 mm thick. Because of the thinness of cover segments and thickness of SOCRA skeleton spines in the prior art, the prior art generally teaches away from embedding of a SOCRA skeleton spine in a binder cover.

The large transverse cross-section of known SOCRA skeleton designs has led to the orientation of the transverse cross-section such that the major dimension is substantially radial to the center of the rings in an attempt to minimize the binder footprint. However, this orientation has made attachment to the cover more difficult which in turn has led to the use of loose-leaf front and back covers with no middle cover disposed therebetween. Such configuration exposes the rings

and the ends of the loose-leaves leaving both less protected and makes the binder cumbersome to handle and less attractive. In such a known binder, the skeleton creates an awkward lump, thwarting the object of a flat writing surface, when positioned within a stack of loose-leaves or when positioned between the front cover and back cover after the front cover is flipped around against the back cover. U.S. Pat. No. 3,190,293 to Schneider, U.S. Pat. No. 4,904,103 to Im and U.S. Pat. No. 2,331,461 to Dawson are examples of such known binders.

Alternatively, to minimize binder footprints, some loose-leaf binders have independently-openable rings. In some of these loose-leaf binders, the back cover pivots about the thin skeleton spine and the front cover hangs loose-leaf on the rings, but there is no middle cover joining the front cover to the back cover. These designs make insertion and removal of loose-leaves tedious. Also, the exposed rings are unattractive and the loose-leaves are less protected. U.S. Pat. No. 659,860 to Schild and U.S. Pat. No. 2,268,431 to Slonneger are examples of such binders.

Yet another problem with known attempts to build a minimal-footprint binder are inadequate ring shapes having varying loose-leaf capacity when these binders are open 360 degrees versus when they are closed. This variation in capacity results from inclusion of the skeleton among the loose-leaves in one position but not in the other. U.S. Pat. No. 4,904,103 to Im is an example of such a binder.

SUMMARY OF INVENTION

Accordingly, this invention provides an improved binder that satisfies the object of providing a binder with a minimal footprint during operation while obviating the disadvantages of the prior art. The invention includes improvements to the binder skeleton, cover and attachment of the skeleton to the cover.

To minimize the binder footprint, the various embodiments of the invention described below contain at least one of the following elements as features:

(1) Skeleton with a minimal LSCPL (defined below).
(2) SOCRA skeleton.
(3) Cover designs that allow the front cover and back cover to fold in flat formations when open 360 degrees while simultaneously allowing the rings to rotate around an edge of the flatly-folded cover.
(4) Spine of skeleton axially disposed relative to rotation of rings and oppositely rotating back cover when the binder is open 360 degrees.
(5) Spine of skeleton embedded or partially embedded in cover in design and/or during operation of binder.
(6) Middle cover joining front cover to back cover.
(7) Attachment of the middle cover to back cover so that the covers do not interfere with rotation of the rings when the binder is opened 360 degrees.
(8) Slots or holes to eliminate interference of cover with skeleton rings as skeleton rings rotate through plane of back cover.
(9) Longest ring dimension is much larger than the LSCPL (defined below).
(10) Attachment of skeleton to cover in a way that allows the front cover to lie flat on the back cover while the binder is open 360 degrees.
(11) Rings hidden (not exposed) when binder is closed.
(12) Writing-support pads (described below).
(13) Stable, incremental rotation of rings about an edge of the flatly-folded cover without a strong bias to particular positions.

(14) Ring shapes with particular orientations to skeleton and cover to optimize or stabilize binder capacity.

The preferred embodiments have a spine. LSCPL is an acronym for the Longest Spine Cross-section Perimeter Line segment and refers to the longest line segment connecting two points on the perimeter of the transverse cross-section of the skeleton spine. For example, for a skeleton spine having a circular cross-section, the LSCPL is the circle's diameter; for an ellipse, the LSCPL is the major axis; for a square or rectangle, the LSCPL is a diagonal; for a triangle, the LSCPL is the longest side of the triangle.

The LSCPL dimension is important. When the binder cover is open 360 degrees, the binder cover is turned inside out such that at least a portion of the interior surfaces of the front and back covers face in opposite directions and the skeleton spine as well as a portion of the cover may be sandwiched between forward and latter loose-leaves. Preferably, the cover folds flat when open 360 degrees. The rings must be able to rotate while the cover is open 360 degrees. In the preferred embodiments, rotation of the rings necessitates that the spine rotate. If the LSCPL dimension is less than or equal to the thickness of the front and back covers, the spine can lie completely between the interior surface planes of the front and back cover throughout the complete range of the spine's rotation; in this case, the spine can remain flush with the front and back cover so that any potential lump caused by the spine while it is sandwiched between forward and latter loose-leaves is minimized or prevented so as to present a flatter top loose-leaf surface. Furthermore, the LSCPL dimension influences the desired thickness of a cover segment having a conduit in which the spine is rotatably disposed as a pivot of cover rotation; as the cover segment rotates about the spine, the conduit containing the spine must accommodate the LSCPL dimension.

Various features of each preferred embodiment cooperate to enable its loose-leaves above and below the back cover to lie flat and parallel when the cover is open 360 degrees whether none, one, many, or all of the loose-leaves are flipped below the back cover.

In the preferred embodiments, a SOCRA skeleton is rotatably disposed in a cover such that (1) the spine is a pivot about which the cover can rotate and (2) the spine is axially disposed relative to opposite rotations of the cover and rings.

Several embodiments of skeletons for use with the binder are disclosed for minimizing the LSCPL. For example, in one embodiment of a skeleton, the rings are attached via a space-saving weld or braze versus the space-demanding riveting of conventional binders.

Embedment of a skeleton in a cover segment without the segment becoming awkwardly thick and unattractive becomes feasible beginning with skeletons having LSCPL values of about 7-9 mm. Most preferably, the LSCPL of the skeleton is less than or equal 5 mm.

Preferably, the binder has a SOCRA skeleton with a synchronized switching element to open or close its rings simultaneously. The preferred synchronized switching element has a first connective element which connects to one set of ring segments and a second connective element which connects to a corresponding and opposing second set of ring segments. The synchronized switching element has a mechanism to enable the first connective element to move in relation to the second connective element so as to open or close the first ring segments relative to the second ring segments.

Means for attaching the front, middle and back cover segments are also disclosed.

OBJECTS AND ADVANTAGES

Accordingly, several objects or advantages of my invention contained in various embodiments described below are:

(a) to provide a binder which can minimize its footprint during use by flipping the front cover and any number of forward loose-leaves flatly beneath the back cover and latter loose-leaves and which lacks the limitations and failings of past attempts cited;

(b) to provide a binder which is reversible, so that either side may be used with equal advantages, the reversal being accomplished by opening the binder 360 degrees and then positioning it to access either the back of the exposed forward loose-leaf page or front of the exposed latter page, whereby either or both sides of a page may be written upon;

(c) to provide a binder which always presents a flat writing surface including when the front cover is opened 180 or 360 degrees relative to the back cover, and the whole surface of the current loose-leaf page is flat and can be used from edge to edge and top to bottom;

(d) to provide a binder whose front and back covers and optional writing-support pads may take the place of a desk, offering good support to write upon if the pad is rested in a lap or held in the hand;

(e) to provide an attractive binder with rings hidden when closed;

(f) to provide a binder affording superior protection to loose-leaves via a surrounding cover;

(g) to provide a binder that is easy to handle, conveniently packs in brief cases and book bags and stacks or stands well on a bookshelf;

(h) to provide a binder which reduces tearing stress on its loose-leaf pages when they are flipped beneath the back cover and latter pages;

(i) to provide a thin binder when closed by embedding the skeleton spine in the cover;

(j) To provide a binder with releasably retaining rings to bind loose-leaf pages permitting easy addition or removal of loose-leaf pages as desired;

(k) to provide a binder with the ability to simultaneously open or close all of the binder's rings by a skeleton mechanism to reduce the effort of adding or removing loose-leaf pages;

(l) to provide a binder with the smallest possible LSCPL skeleton value to eliminate or minimize any lump cause by the skeleton when the binder is open 360 degrees but where the skeleton fulfills its requirement to enable simultaneous opening and closing of all rings;

(m) to provide a binder with a skeleton which can accommodate various numbers and spacings of rings;

(n) to provide a binder with a skeleton that is spring urged to or can be locked in either of two stable states, an open position or closed position so its rings do not inadvertently open or close;

(o) to provide a skeleton with a ring shape that provides substantially constant capacity during operation when the skeleton may be rotated from its upright position; and

(p) to provide a binder that can be manufactured cheaply.

Further objects and advantages of my invention will become apparent from consideration of the drawings and ensuing description.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1**A is a perspective view of an embodiment of the binder of the present invention with its front cover open approximately 120 degrees relative to the back cover in which the spine of the binder skeleton is rotatably disposed.

FIG. **1**B is a perspective view of the binder of FIG. **1**A in its closed position.

FIG. **1**C is a perspective view of the binder of FIG. **1**A with the front cover and forward loose-leaf pages flipped 180 degrees open relative to the back cover.

FIG. **1**D is a perspective view of the binder of FIG. **1**A with the front cover and forward loose-leaf pages flipped approximately 360 degrees to a fully open position flatly beneath the back cover and latter loose-leaf pages.

FIG. **1**E is a cross-sectional view of the binder of FIG. **1**D along line **1**E-**1**E in FIG. **1**D.

FIG. **1**F is a sectional view of the binder of FIG. **1**E after it has been flipped over 180 degrees to enable writing on the back side of a forward loose-leaf page.

FIG. **1**G is a perspective view of the skeleton of FIG. **1**A with the rings closed.

FIG. **1**H is a perspective view of the skeleton of FIG. **1**A with the rings open.

FIG. **1**I is a perspective view of a component of the skeleton of the binder of FIG. **1**A.

FIG. **1**J is a perspective view of additional components of the skeleton of the binder of FIG. **1**A. As is apparent from FIGS. **1**A, **1**G-**1**H and **1**K-**1**L, the inner rod is preferably inserted into the hollow outer tube prior to the attachment of the ring halves to the inner rod during the manufacture of the spine.

FIG. **1**K is a perspective view of the skeleton of the binder of FIG. **1**A, when the rings are in the closed position, with a sectional portion displaying the construction of the synchronized switching element that is disposed within the spine and that simultaneously opens or closes the rings of the binder.

FIG. **1**L is a perspective view of the skeleton of the binder of FIG. **1**A, when the rings are in the open position, with a sectional portion displaying the construction of the synchronized switching element that is disposed within the spine and that simultaneously opens or closes the rings.

FIG. **2**A is a perspective view of a second embodiment of the binder in the closed position where its front cover rides loose-leaf on its rings but is also connected to its middle cover by an attachment seam that is exterior to the binder rings.

FIG. **2**B is a cross-sectional view of FIG. **2**A indicated by the section lines **2**B-**2**B in FIG. **2**A.

FIG. **2**C is a perspective view of the binder of FIG. **2**A with loose-leaf pages removed and with the front cover flipped 180 degrees open relative to the back cover while the middle cover folds along an 180-degree-open crease.

FIG. **2**D is the cross section of FIG. **2**B where the front cover and forward loose-leaf pages have been flipped 180 degrees open relative to the back cover and the middle cover folds along a 180-degree-open crease.

FIG. **2**E is the cross section of FIG. **2**B where the front cover and forward loose-leaf pages have been flipped 360 degrees flatly beneath the back cover and latter loose-leaf pages and the middle cover folds along a 360-degree-open crease.

FIG. **3**A is a perspective view of a third embodiment of the binder in the closed position where its front cover rides loose-leaf on its rings via cover-ring connection loops.

FIG. **3**B is a cross-sectional view of FIG. **3**A indicated by the section lines **3**B-**3**B in FIG. **3**A.

FIG. **3**C is a perspective view of the binder of FIG. **3**A with the front cover and forward loose-leaf pages flipped

180 degrees open relative to the back cover and with the middle cover folded along two 180-degree-open creases.

FIG. **3**D is a cross-sectional view of FIG. **3**C indicated by the section lines **3**D-**3**D in FIG. **3**C.

FIG. **3**E is the cross-section of FIG. **3**B where the front cover and forward loose-leaf pages have been flipped 360 degrees flatly beneath the back cover and latter loose-leaf pages and the middle cover folds along a 360-degree-open crease.

FIG. **4**A is a perspective view of a fourth embodiment of the binder where part of the middle cover is interfaced to the front cover and is rotatable about the spine of the binder skeleton and the other part of the middle cover is interfaced to the back cover and is also rotatable about the spine of the binder skeleton.

FIG. **4**B is a perspective view of the binder of FIG. **4**A with the front cover flipped 180 degrees open relative to the back cover and with the middle cover stretched flush between them.

FIG. **4**C is a perspective view of the binder of FIG. **4**A with the front cover flipped 360 degrees open relative to the back cover while the segment of the middle cover that is interfaced to the front cover has been rotated roughly 180 degrees relative to the segment of the middle cover interfaced to the back cover.

FIG. **4**D is a bottom view of the binder of FIG. **4**C with loose-leaf pages added.

FIG. **5**A is a perspective view of a fifth embodiment of the binder with its front and back covers interfaced to a middle cover with a middle beam that is rotatable about the spine of the skeleton.

FIG. **5**B is a bottom view of the binder of FIG. **5**A with loose-leaf pages added and where the front cover and forward loose-leaf pages have been flipped 360 degrees flatly beneath the back cover and latter loose-leaf pages.

FIG. **6**A is a perspective view of a sixth embodiment of the binder with a loose-leaf front cover, no middle cover, and the back cover rotatable about the spine of the binder skeleton.

FIG. **6**B is a perspective view of the back cover of the binder of FIG. **6**A.

FIG. **7**A is a perspective view of a seventh embodiment of the binder having a quad-planar cover, composed of a back cover interfaced to a bi-planar middle cover that interfaces to a front cover, and having the spine of the binder skeleton rotatably disposed adjacent a free edge of the back cover.

FIG. **7**B is a bottom view of the binder of FIG. **7**A where forward loose-leaf pages have been flipped flatly beneath the cover segment containing the skeleton and beneath the latter loose-leaf pages and where the cover has been folded into a "Z" shape.

FIG. **8** is a perspective view of an eighth embodiment of the binder which is similar to the seventh embodiment but is also zipper-closable and the back cover is attached or detached via a hook-and-loop fastener.

FIG. **9** is a bottom view of a ninth embodiment of the binder which is similar to embodiment one but with a second middle cover segment that is interfaced to the front cover and that connects via hook-and-loop fastener to the back cover to fasten the binder shut.

FIG. **10** is a bottom view of a tenth embodiment of the binder and is similar to embodiment 9, but switches the position of permanent middle-cover-back-cover attachment with that of the hook-and-loop middle-cover-back-cover attachment position.

FIG. **11** is a bottom view of an eleventh embodiment of the binder with two opposing and enveloping front cover halves that fasten shut with a hook-and-loop fastener and where one front half is permanently connected to the back cover similar to Embodiment 1 while the other half is permanently interfaced to the back cover similar to Embodiment 10.

FIG. **12** is a perspective view of a twelfth embodiment of the binder having a quad-planar cover composed of a back cover which is rotatable about the spine of the skeleton and whose top edge is interfaced to the top edge of one of the planar segments of a bi-planar middle cover.

FIG. **13**A is a perspective view of a thirteenth embodiment of the binder with the middle cover attached to the back cover in a manner similar to binder **1** but the back cover rides loose-leaf on the rings and the skeleton is not embedded in the cover.

FIG. **13**B is a bottom view of the binder of FIG. **13**A with the front cover flipped 360 degrees open relative to the back cover and with the front cover folded upon itself.

FIG. **14**A is a perspective view of a fourteenth embodiment of the binder with the middle cover attached to the front and back covers in a manner similar to binder **2** but both the front and back covers ride loose-leaf on the rings and the skeleton is not embedded in the cover.

FIG. **14**B is a bottom view of the binder of FIG. **14**A with the front cover flipped 180 degrees open relative to the back cover and with the middle cover folded along a 180-degree-open crease.

FIG. **14**C is a bottom view of the binder of FIG. **14**A with the front cover flipped 360 degrees open relative to the back cover and with the middle cover folded along a 360-degree-open crease.

FIG. **15** is a bottom view of a fifteenth embodiment of the binder with the front cover open 180 degrees relative to the back cover, the skeleton embedded in the middle cover, the front and back covers ride loose-leaf on the rings, and the middle cover is connected to the front and back cover at attachment seams exterior to the rings.

FIG. **16**A is a perspective view of a sixteenth embodiment of the binder which is similar to binder **1** but with openings instead of slots.

FIG. **17** is a perspective view of a seventeenth embodiment of the binder with the skeleton embedded near the top edge of the back cover so that loose-leaves hang from the top of the back cover.

FIG. **18**A is a perspective view of an eighteenth embodiment of the binder where the back cover is rotatable about the spine of the skeleton, the planar segment of the bi-planar middle cover which interfaces with the back cover folds 180 degrees relative to the back cover and slot-holes that are half in the back cover and half in the middle cover are bisected by this fold and enable the rings to rotate counterclockwise without interfering with the back or middle cover.

FIG. **18**B is a bottom view of the binder of FIG. **18**A with the front cover flipped 180 degrees open relative to the back cover and with the addition of writing-support pads and loose-leaves.

FIG. **19**A is a perspective view of a nineteenth embodiment of the binder which is similar to binder **18** with the addition of a folding slot cover.

FIG. **19**B is a bottom view of the binder of FIG. **19**A with the front cover in its closed position relative to the back cover and the folding slot cover in its stretched position and with the addition of writing-support pads and loose-leaves.

FIG. **19**C is a bottom view of the binder of FIG. **19**A with the front cover flipped 360 degrees open relative to the back cover and the folding slot cover in its folded position and with the addition of writing-support pads and loose-leaves.

FIG. **20**A is a perspective view of a twentieth embodiment of the binder where the skeleton is embedded in a conduit and where the rings of the skeleton are looped through holes in the middle cover.

FIG. **20**B is a bottom view of the binder of FIG. **20**A with the front cover in its closed position relative to the back cover and with the addition of loose-leaves.

FIG. **20**C is a bottom view of the binder of FIG. **20**A with the front cover flipped 360 degrees open relative to the back cover and with the addition of loose-leaves.

FIG. **21**A is a bottom view of a twenty-first embodiment of the binder in the closed position which is similar to the binder **20** but where the skeleton is embedded in a middle cover conduit of a constant cross-sectional shape.

FIG. **21**B is a bottom view of the binder of FIG. **21**A with the front cover flipped 360 degrees open relative to the back cover.

FIG. **22**A is a bottom view of a twenty-second embodiment of the binder in a closed position which is similar to the binder **21**, but where the skeleton is not embedded in any conduit of the cover so that the middle cover rides loose-leaf on the rings.

FIG. **22**B is a bottom view of the binder of FIG. **22**A with the front cover flipped 360 degrees open relative to the back cover.

FIG. **23**A is a bottom view of a twenty-third embodiment of the binder in a closed position having a flexible middle cover and a skeleton with a conventional arc-shaped spine which is firmly attached to the cover via a staple-thin rivet and is able to rotate via the flexibility of the middle cover.

FIG. **23**B is a bottom view of the binder of FIG. **23**A with its front cover open 360 degrees and with all its loose-leaves resting above the back cover.

FIG. **23**C is a bottom view of the binder of FIG. **23**A, but with its front cover, a writing-support pad, and one forward loose-leaf flipped beneath the back cover and latter loose-leaves.

FIG. **23**D is a bottom view of the binder of FIG. **23**A, but with its front cover, a writing-support pad, and half the loose-leaves flipped beneath the back cover and remaining half of the loose-leaves.

FIG. **23**E is a bottom view of the binder of FIG. **23**A, but with its front cover, a writing-support pad, and all but one forward loose-leaf flipped beneath the back cover and the one remaining latter loose-leaf.

FIG. **24**A is a bottom view of a twenty-fourth embodiment of the binder in the closed position which is similar to the binder **23** but with a thinner, more flexible middle cover and a conventional round rivet that attaches its skeleton to its middle cover.

FIG. **24**B is a bottom view of the binder of FIG. **24**A, but with its front cover, a writing-support pad, and one forward loose-leaf flipped beneath the back cover and latter loose-leaves.

FIG. **24**C is a bottom view of the binder of FIG. **24**A, but with its front cover, a writing-support pad, and half the loose-leaves flipped beneath the back cover and remaining half of the loose-leaves.

FIG. **25**A is a bottom view of a twenty-fifth embodiment of the binder in the closed position which has the same skeleton as the binders **23** and **24**, but whose skeleton rotates via a hinge joint in its back cover.

FIG. **25**B is a bottom view of the binder of FIG. **25**A, but with its front cover, a writing-support pad, and one forward loose-leaf flipped beneath the back cover and latter loose-leaves.

FIG. **26**A is a perspective view of a second embodiment of a skeleton for use with the binder displaying the position of the skeleton actuator knob when the rings are in the open position.

FIG. **26**B is a bottom, partial cross-sectional view of the skeleton of FIG. **26**A displaying the construction of the synchronized switching element when the rings are in the closed position.

FIG. **26**C is a front cross-sectional view of the skeleton of FIG. **26**A displaying the construction of the synchronized switching element and actuator knob position when the rings are in the closed position.

FIG. **27**A is a perspective view of a third embodiment of a skeleton for use with the binder having sectional portions displaying the construction of the synchronized switching element when the rings are in the closed position.

FIG. **27**B is a perspective view of the skeleton of FIG. **27**A with sectional portions displaying the construction of the synchronized switching element when the rings are in the open position.

FIG. **28**A is a perspective view of a fourth embodiment of a skeleton for use with the binder having sectional portions displaying the construction of the synchronized switching element when the rings are in the closed position.

FIG. **28**B is a perspective view of the skeleton of FIG. **28**A with sectional portions displaying the construction of the synchronized switching element when the rings are in the open position.

FIG. **29**A is a perspective view of a fifth embodiment of a skeleton for use with the binder that has its rings closed.

FIG. **29**B is a bottom view of a ring component of the skeleton of **29**A.

FIG. **29**C is a partial, cross-sectional view of FIG. **29**A indicated by the section lines **29**C-**29**C in FIG. **29**A.

FIG. **30**A is a bottom view of a first embodiment of a ring for use with the binder that has a partially elliptical shape with a linear top segment.

FIGS. **30**B-**30**F are bottom views of the binder of FIG. **1** with its rings replaced with rings of FIG. **30**A; FIGS. **30**B-**30**F depict skeleton rotation and related cover positions as the front cover, writing-support pad, and varying numbers of forward loose-leaves are flipped beneath the back cover and varying numbers of latter loose-leaves.

FIG. **31**A is a bottom view of a second embodiment of a ring for use with the binder that has a partially elliptical shape with linear top and bottom segments.

FIGS. **31**B-**31**F are bottom views of the binder of FIG. **1** with its rings replaced with rings of FIG. **31**A; FIGS. **31**B-**31**F depict skeleton rotation and related cover positions as the front cover, writing-support pad, and varying numbers of forward loose-leaves are flipped beneath the back cover and varying number of latter loose-leaves.

FIG. **32**A is a bottom view of a third embodiment of a ring for use with the binder that has a partially elliptical shape with three linear top segments.

FIGS. **32**B-**32**F are bottom views of the binder of FIG. **1** with its rings replaced with rings of FIG. **32**A; FIGS. **32**B-**32**F depict skeleton rotation and related cover positions as the front cover, writing-support pad, and varying numbers of forward loose-leaves are flipped beneath the back cover and varying number of latter loose-leaves.

FIG. **33**A is a bottom view of a fourth embodiment of a ring for use with the binder that has a partially elliptical shape with two linear top segments.

FIGS. **33**B-**33**F are bottom views of the binder of FIG. **1** with its rings replaced with rings of FIG. **33**A; FIGS. **33**B-**33**F depict skeleton rotation and related cover positions

as the front cover, writing-support pad, and varying numbers of forward loose-leaves are flipped beneath the back cover and varying number of latter loose-leaves.

FIG. **34** is the bottom view of another preferred embodiment of a ring component.

FIG. **35** is the bottom view of another preferred embodiment of a ring component.

FIG. **36**A is a perspective view of a sixth preferred embodiment of a skeleton for use with the binder.

FIG. **36**B is a perspective view of components of the skeleton of FIG. **36**A.

FIG. **36**C is a perspective view of additional components of the skeleton of FIG. **36**A.

FIG. **36**D is a perspective view of a wrap housing component of the skeleton of FIG. **36**A.

FIG. **36**E is a bottom view of the skeleton of FIG. **36**A with a sectional portion displaying the construction of the spreader component of the actuator (also known as the synchronized switching element) when the rings are in the closed position.

FIG. **36**F is a bottom view of the skeleton of FIG. **36**A when the rings are in the open position.

FIG. **37**A is a perspective exploded view of a spreader component of the skeleton of FIG. **37**C.

FIG. **37**B is a perspective view of torque lever components attached to the spine of the skeleton of FIG. **37**C.

FIG. **37**C is a bottom view of another preferred embodiment of a skeleton for use with the binder with a sectional portion displaying the construction of the spreader component of the actuator when the rings are in the closed position.

FIG. **37**D is a bottom view of the skeleton of FIG. **37**C when the rings are in the open position.

FIG. **38**A is a perspective view of a spreader component attached to torque levers, which are attached to the spine of the skeleton of FIG. **38**B.

FIG. **38**B is a bottom view of another preferred embodiment of a skeleton for use with the binder with a sectional portion displaying the construction of the spreader component of the actuator when the rings are in the closed position.

FIG. **38**C is a bottom view of the skeleton of FIG. **38**B with a sectional portion displaying the construction of the spreader component of the actuator when the rings are in the open position.

FIG. **39**A is a front view of a spreader component of the skeleton of FIG. **39**B.

FIG. **39**B is a bottom view of another preferred embodiment of a skeleton for use with the binder when the rings are closed.

FIG. **39**C is a bottom view of the skeleton of FIG. **39**B when the rings are open.

FIG. **40**A is a perspective view of another preferred embodiment of a skeleton for use with the binder with a sectional portion displaying part of the construction of the actuator when the rings are in the closed position.

FIG. **40**B is a perspective view of the skeleton of FIG. **40**A when the rings are open.

FIG. **41**A is a perspective view of another preferred embodiment of a skeleton for use with the binder.

FIG. **41**B is a perspective view of components of the skeleton of FIG. **41**A.

FIG. **41**C is a perspective view of additional components of the skeleton of FIG. **41**A.

FIG. **41**D is a perspective view of a wrap band component of the skeleton of FIG. **41**A.

FIG. **41**E is a bottom view of the skeleton of FIG. **41**A with a sectional portion displaying the construction of the spreader component of the actuator when the rings are in the closed position.

FIG. **41**F is a bottom view of the skeleton of FIG. **41**A with a sectional portion displaying the construction of the spreader component of the actuator when the rings are in the open position.

FIG. **42** is a bottom sectional view of another preferred embodiment of a spine for use with the binder with ring segments attached.

FIG. **43**A is a bottom view of another preferred embodiment of a skeleton for use with the binder with a sectional portion displaying the construction of the actuator when the rings are in the closed position.

FIG. **43**B is a bottom view of the skeleton of FIG. **43**A with a sectional portion displaying the construction of the actuator when the rings are in the open position.

FIG. **44** is a bottom view of another preferred embodiment of a ring for use with the binder.

FIG. **45**A is a perspective view of another preferred embodiment of a skeleton for use with the binder.

FIG. **45**B is a bottom view of the binder of FIG. **1** with its skeleton replaced by the skeleton of FIG. **45**A and with its rings in the upright position.

FIG. **45**C is a bottom view of the binder of FIG. **1** with its skeleton replaced by the skeleton of FIG. **45**A and with its rings rotated counterclockwise from the upright position.

FIG. **46**A is a perspective view of a preferred embodiment of a conduit casing for use with the binder.

FIG. **46**B is a perspective view of another preferred embodiment of a cover for use with the binder incorporating the conduit casing of FIG. **46**A.

FIG. **47**A is a perspective view of another preferred embodiment of a conduit casing for use with the binder.

FIG. **47**B is a perspective view of another preferred embodiment of a cover for use with the binder incorporating the conduit casing of FIG. **47**A.

FIG. **48**A is a perspective view of another preferred embodiment of a cover for use with the binder having a conduit casing with an instant user-sealed wrap-flap closure facilitating skeleton selection by user.

FIG. **48**B is a bottom view of another preferred embodiment of the binder employing the cover of FIG. **48**A and skeleton of FIG. **48**C.

FIG. **48**C is a perspective view of another preferred embodiment of a skeleton for use with the binder molded as a single piece of plastic.

FIG. **48**D is a perspective view of a sliding zipper tab component of a sequential switching element for use with the skeleton of FIG. **48**C.

FIG. **48**E is a perspective view of the cover of FIG. **48**A with its conduit casing adhesively sealed close.

FIG. **49**A is a perspective view of another preferred embodiment of a cover for use with the binder with an extra thin closed-cover thickness.

FIG. **49**B is a bottom view of another preferred embodiment of the binder employing the cover of FIG. **49**A and skeleton of FIGS. **49**D-**49**E and positioned with its cover closed.

FIG. **49**C is a bottom view of the binder of FIG. **49**B positioned with its front cover flatly opened 360 degrees relative to its back cover.

FIG. **49**D is a bottom view of another preferred embodiment of a skeleton for use with the binder with oblong elliptical rings.

FIG. **49**E is a perspective view of a portion of the skeleton of FIG. **49**D as initially molded as a single piece of plastic.

FIG. **50**A is a bottom view of another preferred embodiment of a cover for use with the binder with an extra thin closed-cover thickness and with a conduit casing having an instant user-sealed wrap-flap closure facilitating skeleton selection by user.

FIG. **50**B is a bottom view of another preferred embodiment of the binder incorporating the cover of FIG. **50**A and skeleton of FIG. **49**E and is positioned with its front cover flatly opened 360 degrees relative to its back cover with ring-bound loose-leaves added.

FIG. **51**A is a bottom view of another preferred embodiment of a cover for use with the binder with an extra thin closed-cover thickness and with a conduit casing having an instant user-sealed wrap-flap closure.

FIG. **51**B is a bottom view of another preferred embodiment of the binder incorporating the cover of FIG. **51**A and skeleton of FIG. **49**E and is positioned with its front cover flatly opened 360 degrees relative to its back cover.

FIG. **52**A is a perspective view of another preferred embodiment of the binder incorporating the skeleton of FIG. **49**E and having instant user-affixed attachment strips for permanent placement upon folder surfaces.

FIG. **52**B is a perspective view of a typical folder to which the binder of FIG. **52**A can be attached and indicates preferred attachment locations.

FIG. **53**A is a perspective view of a preferred embodiment of a subassembly comprising a conduit casing joined to another preferred embodiment of a skeleton for use with the binder.

FIG. **53**B is a perspective view of another preferred embodiment of a ring for use with the binder and which is reversibly compressible.

FIG. **53**C is a bottom view of another preferred embodiment of the binder, which is situated under vertical compression with ring-bound loose-leaves and which has an ultra thin closed-cover thickness made possible by reversibly compressible rings of FIG. **53**B.

FIG. **53**D is a bottom view of the binder of FIG. **53**C positioned with its front cover opened 360 degrees relative to its back cover in a flat formation with its ring-bound loose-leaves.

FIG. **53**E is a bottom view of another preferred embodiment of a conduit casing for use with the binder.

FIG. **54**A is a bottom view of another preferred embodiment of the binder featuring an ultra thin aesthetically-pleasing streamline closed cover contour via compressible rings of FIG. **54**K synergistically combined with a cover having a primary cover fold.

FIG. **54**B is a perspective view of a preferred embodiment of a ring-crush resister for use with the binder.

FIG. **54**C is a bottom view of another preferred embodiment of the binder situated under vertical compression with ring-bound loose-leaves and featuring an ultra thin closed-cover thickness and the ring-crush resister of FIG. **54**B.

FIG. **54**D is a bottom view of the binder of FIG. **54**C positioned with its front cover open 360 degrees relative to its back cover in a flat formation with its ring-bound loose-leaves.

FIG. **54**E is a bottom view of another preferred embodiment of a ring-crush resister for use with the binder.

FIG. **54**F is a bottom view of another preferred embodiment of a cover for use with the binder featuring an ultra thin closed-cover thickness and the ring-crush resister of FIG. **54**E.

FIG. **54**G is a bottom view of another preferred embodiment of a subassembly comprising a integral combination conduit casing ring-crush resister joined to the skeleton of FIG. **54**K for use with the binder.

FIG. **54**H is a bottom view of another preferred embodiment of the binder situated under vertical compression with an ultra thin closed-cover thickness and incorporating the subassembly of FIG. **54**G.

FIG. **54**I is a bottom view of the binder of FIG. **54**H positioned with its front cover opened 360 degrees relative to its back cover in a flat formation.

FIG. **54**J is a bottom view of another preferred embodiment of a cover for use with the binder with an ultra thin closed-cover thickness and featuring another preferred embodiment of a ring-crush resister.

FIG. **54**K is a perspective view of another preferred embodiment of a skeleton for use with the binder featuring reversibly compressible rings with flip-top hinges as initially molded as a single piece of plastic.

FIG. **55**A is a view of another preferred embodiment of a reversibly compressible ring for use with the binder and that is situated upright and freely expanded with an oblong roughly rectangular shape.

FIG. **55**B is a view of the ring of FIG. **55**A situated under vertical compression.

FIG. **56**A is a view of another preferred embodiment of a reversibly compressible ring for use with the binder and that is situated upright and freely expanded with an oblong roughly trapezoidal shape.

FIG. **56**B is a view of the ring of FIG. **56**A situated under vertical compression.

FIG. **57**A is a view of another preferred embodiment of a reversibly compressible ring for use with the binder and that is situated upright and freely expanded with an oblong roughly shoe-like shape with ring-bound loose-leaves indicating design support for adroit page-turning.

FIG. **57**B is a view of the ring of FIG. **57**A situated under vertical compression.

FIG. **58**A is a view of another preferred embodiment of a reversibly compressible ring for use with the binder and that is situated upright and freely expanded with an oblong carriage-suspension-like shape or roughly rhombus shape.

FIG. **58**B is a view of the ring of FIG. **58**A situated under vertical compression.

FIG. **59**A is a view of another preferred embodiment of a reversibly compressible ring for use with the binder and that is situated upright and freely expanded with an oblong roughly triangular shape with ring-bound loose-leaves indicating design support for adroit page-turning and featuring a telescopic interlock for extra compressibility.

FIG. **59**B is a view of the ring of FIG. **59**A situated under vertical compression.

FIG. **60** is a perspective view of another preferred embodiment of an oblong ring for use with the binder featuring a spiral closure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **1**A-**1**L

A first preferred embodiment of the binder **1** of the present invention is illustrated in FIGS. **1**A-**1**D (perspective views of the binder **1** open 120 degrees, 0 degrees, 180 degrees, and 360 degrees, respectively), FIGS. **1**E-**1**F (bottom views of the binder **1** open 360 degrees), and FIGS. **1**G-**1**L (perspective views of the skeleton **50** of the binder **1**). The

binder **1** comprises cover **100** and skeleton **50** with optional loose-leaf writing-support pads **61**A and **61**B.

Cover **100** includes back cover **40**, middle cover **42**, and front cover **44**. Back cover **40** has interior surface **40**N and exterior surface **40**X and front cover **44** has interior surface **44**N and exterior surface **44**X. Back cover **40**, middle cover **42** and front cover **44** are typically made of cardboard, plastic, or other semi-rigid material that is optionally covered by a more flexible material such as vinyl or leather, but may be composed of any materials used to manufacture binder covers, loose-leaf flip-chart covers, loose-leaf personal organizer covers, or loose-leaf writing-pad covers.

Skeleton **50** comprises the spine **53** and a plurality of rings **46**. Rings **46** have ring segments **46**A and **46**B. Spine **53** includes tube **54** and inner rod **52**. Ring segments **46**B are disposed on tube **54** and ring segments **46**A, complementary with ring segments **46**B, are disposed on inner rod **52**. Spine **53** has a synchronized switching element **51** that simultaneously opens or simultaneously closes ring segments **46**A relative to ring segments **46**B. Ring segments **46**A and ring segments **46**B are disposed perpendicular to spine **53**.

Conduit **56** is defined by the back cover **40** and is proximate to and runs substantially parallel with the edge **40**A of back cover **40**. The spine **53** of the skeleton **50** is rotatably disposed within conduit **56**. Spine **53** is a pivot about which back cover **40** can rotate. Rings **46** are constrained to rotate with spine **53**. Because spine **53** is a pivot of back cover **40** and rings **46** rotate with spine **53**, spine **53** is axially disposed relative to opposite rotations of back cover **40** and rings **46**. Slots **58**A-**58**C are cut perpendicularly into the edge **40**A of back cover **40**. Back cover **40** defines paper margin supports **60**A-**60**D. The purpose of slots **58**A-**58**C which intersect conduit **56** and that of margin supports **60**A-**60**D will become apparent in the explanation of the operation of the binder **1**.

The rings **46** are aligned with their respective slots **58**A-**58**C so that at least a portion of each of the rings **46** is both received in and protrudes from one of the slots **58**A-**58**C and thereby allowing spine **53** to be rotatably disposed within the back cover **40**. Preferably, the tube **54** of spine **53** is constructed to have a relatively small cross-sectional dimension so that back cover **40** need not be unduly thick to define a conduit **56** large enough to receive the tube **54**. Preferably, the cross-sectional dimension of tube **54** ranges from about 4 mm to about 9 mm and more preferably from about 4 mm to 7 mm.

One edge of middle cover **42** merges into the plane of back cover **40** along seam **66** which is parallel to conduit **56**. Seam **66** can be located between conduit **56** and the far parallel edge **40**B of back cover **40** but is preferably located near conduit **56** without intersecting slots **58**A-**58**C. The other edge of middle cover **42** interfaces to an edge of front cover **44**. There need not be a distinct boundary distinguishing middle cover **42** and front cover **44**, but often there is one in the form of a seam, crease, or hinge. Optional pads **61**A and **61**B can be placed loose-leaf on rings **46** between which loose-leaves **72** may be added. The binder **1** has a loose-leaf stack space **79** which is the space available for occupation by loose-leaves **72** concurrently bound on rings **46** when the cover **100** is closed.

FIGS. **1**G-**1**L show perspective and detailed cross-sectional views of skeleton **50** and its components. FIGS. **1**G and **1**H are perspective views of the skeleton **50** with rings **46** closed and open, respectively. In FIG. **1**J, a plurality of ring segments **46**A are attached to rod **52** via a weld, braze, adhesive or other appropriate means; similarly, a corresponding number of ring segments **46**B are attached to tube **54** as shown in FIG. **1**I. When rod **52** is assembled within tube **54**, the spaced ring segments **46**A protrude through similarly spaced slots **55** defined by tube **54**. Preferably, the width of slots **55** approximates the cross-sectional diameter of ring segments **46**A, or guide mechanisms of some type—such as cylindrical grooves cut into the inner surface of tube **54** with complementary cylindrical flanges attached to rod **52**—are provided to constrain rod **52** from moving longitudinally relative to tube **54**. Slots **55** are cut long enough to enable tube **54** to concentrically rotate about rod **52** through a limited angle without interference from ring segments **46**A. Tube **54** can be rotated about rod **52** to open or close ring segments **46**A relative to ring segments **46**B. In this embodiment of a skeleton **50**, rod **52** and tube **54** serve as first and second connective elements, respectively, of synchronized switching element **51**.

FIGS. **1**K and **1**L show detailed views of the synchronized switch element **51** of spine **53** in the closed and open states, respectively. Preferably, the synchronized switch element **51** comprises tab **99**A of rod **52** which forms a sliding transmission linkage with slot **29**B which constrains cylinder **29** to rotate with rod **52**, but allows cylinder **29** to slide longitudinally towards and away from rod **52**. Cylindrical flanges **77** maintain the longitudinal center axis of rod **52** coincident with the longitudinal center axis of tube **54** to keep tab **99**A disposed within slot **29**B and ring segments **46**A aligned with ring segments **46**B. The smaller-diameter portion **29**D of cylinder **29** extends through the center of spring **31** and through stop **32**. The larger diameter portion **29**C of cylinder **29** is in constant opposing contact with spring **31** and the motion of portion **29**C is constrained to rotation and longitudinal movement by the inside surface of tube **54**. Semi-annular, dual-slotted ledge **28** is disposed within the inner diameter of tube **54**, and is preferably defined by or integrally formed as part of the tube **54**. Semi-annular ledge **28** defines open notches **28**A and **28**B divided by tooth **28**C. Tongue **29**A of cylinder **29** is kept in constant contact with ledge **28** by spring **31** as tongue **29**A slides over the tooth **28**C to and from the two notches **28**A and **28**B defined by ledge **28** during operation of the binder **1**.

There are four fundamental operations of the binder **1**, (i) opening or closing front cover **44** relative to back cover **40** to see and access the contents of the binder **1**; (ii) writing on loose-leaf sheets; (iii) opening or closing rings **46** to insert or remove loose-leaf items such as paper and pocket folders; and (iv) handling and storage of the binder including carrying it in hand, standing it on a bookshelf, packing it in briefcases or bookbags, and stacking it horizontally.

The binder **1** is opened like a book from its closed position (FIG. **1**B) by spreading its front cover **44** and back cover **40** apart (FIG. **1**A) and, in so doing, usually rotating middle cover **42** relative to back cover **40** and front cover **44**. As shown in FIGS. **1**D-**1**F, the front cover **44** and forward loose-leaves **72**A can be disposed flatly beneath the back cover **40** of binder **1** and latter loose-leaves **72**B to minimize the footprint of the binder **1** during use. When front cover **44** and forward loose-leaves **72**A are pulled beyond 180 degrees relative to back cover **40**, skeleton **50** is able to rotate to accommodate this extended range of motion and thus prevents stress on loose-leaves **72** that could cause them to tear out of the rings **46**. The rotation of skeleton **50** also enables forward loose-leaves **72**A to lay flat against front cover **44** to provide flat writing surfaces when the binder **1** is open 360 degrees (FIGS. **1**E and **1**F).

Open slots **58**A-**58**C are defined by the back cover **40** which allow the rings **46** to (i) stand upright when the back

cover **40** is closed and (ii) rotate along with the skeleton **50**. When the binder is open 180 degrees, skeleton **50** is able to rotate several degrees, typically 5-20 degrees, relative to its upright position because of slots **58**A-**58**C in back cover **40** but is stopped from rotating further by middle cover **42** which presses up against slots **58**A-**58**C when the middle cover **42** is supported by a flat surface. Since middle cover **42** is connected to back cover **40** between conduit **56** and the far parallel edge **40**B of back cover **40**, when front cover **44** is open 360 degrees relative to back cover **40**, middle cover **42** is pulled away from slots **58**A-**58**C and allows for maximum rotation of the rings **46** through the slots **58**A-**58**C. When cover **100** is folded open 360 degrees in a flat formation, a portion of each ring **46** is rotatable about near-ring edge **40**A, the pertinence of which is explained below. The angle of rotation of skeleton **50** from its upright position is determined by the relative number of forward loose-leaves **72**A flipped beneath back cover **40** to latter loose-leaves **72**B; i.e. the more loose-leaves **72** flipped beneath, the greater is the angle of rotation of skeleton **50** from its upright position. Other factors determining the angle that skeleton **50** rotates from its upright position are the diameter of rings **46**, the thickness of back cover **40**, and whether the binder is placed on a surface with the back cover **40** over front cover **44** (FIG. **1**E) or vice versa (FIG. **1**F).

A portion of each ring **46** being rotatable about near-ring edge **40**A of the flatly-folded cover **100** serves two purposes: (1) it enables loose-leaves **72** to clear edge **40**A as they are moved from one side of the back cover **40** to the other side while bound on rings **46** and (2) it enables a first variable segment of each ring **46** to be located on the interior side of back cover **40** while a second variable segment of each ring **46** is concurrently located on the exterior side of back cover **40** which is necessary to enable loose-leaves **72** stacked flatly and bound on rings **46** above back cover **40** to be substantially parallel to loose-leaves **72** stacked flatly and bound on rings **46** below back cover **40**. For purpose (2) above to be possible, the inner diameter of each ring **46** must be greater than the thickness of the flat formation of cover **100** which equals the sum of the thicknesses of front cover **44** and back cover **40** which are placed together when cover **100** is open 360 degrees in the flat formation.

The front cover **44** may be flexible enough or may have a fold or hinge such that it may be folded against itself while it is flipped back against back cover **40** in order to further reduce the footprint of the binder **1** (See FIG. **13**B).

FIG. **1**C shows that users can write on the front or back of any loose-leaf **72** when the binder **1** is open 180 degrees. Likewise, when front cover **44** and forward loose-leaves **72**A are flipped back against back cover **40** and latter loose-leaves **72**B, the user can write on either the front side of the exposed latter loose-leaf **72**B or the back side of the exposed forward loose-leaf **72**A by positioning the binder as illustrated in FIGS. **1**E and **1**F, respectively. In this manner, the binder **1** of the present invention allows the user to write on the front or back of any loose-leaf **72** with the minimal binder footprint.

Whenever skeleton **50** is rotated from its upright position, the margin supports **60**A-**60**D provide support for writing so that almost the entire surface of loose-leaves **72** from left edge to right edge and from top to bottom can be written upon. Pads **61**A-**61**B which also assist in this writing-support effort are likely to be only semi-rigid and thus benefit from the added support of margin supports **60**A-**60**D in providing a flat, well-supported, writing surface. The support provided by both margin supports **60**A-**60**D and loose-leaf writing-support pads **61**A-**61**B help to prevent puncturing loose-leaves **72** during writing.

Rotatably disposing spine **53** of skeleton **50** within back cover **40**, outside of the loose-leaf stack space **79**, provides for a flat writing surface when front cover **44** and any forward loose-leaves **72**A are rotated either 180 degrees with respect to back cover **40** or approximately 360 degrees against the underside of back cover **40** and latter loose-leaves **72**B. Spine **53** must be able to rotate with respect to the back cover **40** and be planar therewith in order to avoid the creation of uneven writing surfaces.

Skeleton **50** of FIG. **1**A includes a synchronized switch element **51** to simultaneously open all rings **46** to a stable open state (FIGS. **1**H and **1**L) or to simultaneously close all rings **46** to a stable closed state (FIGS. **1**G and **1**K). Although, FIGS. **1**K and **1**L show some components of the synchronized switch element **51** to be disposed on one end of skeleton **50**, corresponding mirror-image components of the synchronized switching element **51** may be disposed on the opposite end of skeleton **50**, integrally formed with tab **99**B, to provide more balanced operation. Opening skeleton **50** involves separating the interfacing free ends of ring segments **46**A and ring segments **46**B which permits the reception or removal of the loose-leaf sheets (FIGS. **1**H and **1**L). Closing skeleton **50** involves adjoining the free ends of ring segments **46**A and ring segments **46**B to form completely closed rings **46** that secure the loose-leaf sheets within the binder (FIGS. **1**G and **1**K).

To open skeleton **50**, any two opposing ring segments **46**A and **46**B are pulled apart by the user's fingers. This action triggers the synchronized switch element **51** to open all of the rings **46** simultaneously. In operation, the rod **52** of synchronized switching element **51** is caused to rotate relative to tube **54** and is resisted by spring **31** when any of the two opposing ring segments **46**A and **46**B are pulled apart. As rod **52** rotates relative to tube **54**, cylinder **29** is constrained to rotate in sync by tab **99**A and slot **29**B but is also pushed longitudinally towards rod **52** by the spiral section or tooth **28**C of ledge **28** causing the compression of spring **31** between cylinder **29** and stop **32**. As rod **52** is rotated half between the closed and open positions, tongue **29**A of cylinder **29** is forced out of notch **28**A and slides over the tooth **28**C thus enabling spring **31** to expand and push tongue **29**A into notch **28**B thereby stopping the rotation of rod **52**. As shown in FIG. **1**L, when tongue **29**A is disposed in notch **28**B, the rings **46** are in their open position and held therein by spring **31** biasing tongue **29**A into notch **28**B.

To close skeleton **50**, any two opposing ring segments **46**A and **46**B are pushed together by the user's fingers which again triggers the synchronized switching element **51** to close all of the rings **46** simultaneously. The action of pushing any two opposing ring segments **46**A and **46**B together causes rod **52** of synchronized switching element **51** to rotate relative to tube **54** against the resistance of spring **31**. As rod **52** rotates relative to tube **54**, cylinder **29** is constrained to rotate in sync by tab **99**A and slot **29**B but is also pushed longitudinally or linearly towards rod **52** by tooth **28**C of annular ledge **28** causing the compression of spring **31** between cylinder **29** and stop **32**. As rod **52** is rotated half between the open and closed positions, tongue **29**A of cylinder **29** is forced out of notch **28**B and slides over tooth **28**C thus enabling spring **31** to expand and push tongue **29**A into notch **28**A thereby stopping the rotation of rod **52**. As shown in FIG. **1**K, when tongue **29**A is disposed in notch **28**A, the rings are in their closed position and held therein by spring **31** biasing tongue **29**A into notch **28**A.

The binder cover **100**, when closed, almost completely encompasses loose-leaves **72** and skeleton **50** including rings **46** and thus resembles a book. The encompassing is such that each of 270 rays emanating from the center of one of the rings **46** and spaced at consecutive 1-degree angular increments and intersecting the perimeter of that ring **46** subsequently intersects the cover **100** when the cover **100** is closed. Consequently, it is easier to stand the binder **1** on a shelf, it is less awkward to carry, it is easier to store in containers such as book shelves, brief cases, and back packs, it is more attractive, and it provides more protection to the loose-leaf pages **72** than a binder with a less enveloping cover, such as those with exposed rings.

FIGS. **2**A-**2**E

FIGS. **2**A-**2**E show perspective and sectional views of another preferred embodiment of a binder **2** of the present invention. The binder **2** comprises cover **200** and skeleton **50**. Cover **200** includes front cover **144**, middle cover **142**, and back cover **40**. The binder **2** comprises the same back cover **40** and skeleton **50** as the binder **1** shown in FIGS. **1**A-**1**L, but incorporates a different middle cover **142** and front cover **144**. Front cover **144** defines holes **74**A for receiving rings **46** thereby enabling front cover **144** to be releasably bound by rings **46** in the same manner that loose-leaves **72** are releasably bound by the rings **46**. Front cover **144** is connected to middle cover **142** via seam **166** which is disposed between holes **74**A and the far parallel edge **144**A of front cover **144**. The preferred location of seam **166** is nearer holes **74**A than the far edge **144**A of front cover **144**. Middle cover **142** has crease **80** and crease **82** and connects to back cover **40** as in the binder **1** as shown in FIGS. **1**A-**1**C.

Because front cover **144** rides loose-leaf on rings **46**, rings **46** constrain the motion of front cover **144**. When the binder **2** is opened 180 degrees and placed on a surface or when the binder **2** is opened 360 degrees, rings **46** constrain front cover **144** which in turn forces middle cover **142** to fold upon itself. To encourage smooth folding with a minimal resulting lump, creases **80** and **82** are preferably formed in middle cover **142**. When the binder **2** is opened 180 degrees, middle cover **142** tends to fold along crease **80** and when the binder **2** is opened 360 degrees, middle cover **142** tends to fold along crease **82**. For illustrative purposes, middle cover **142** has noticeable thickness in FIGS. **2**A-**2**E; in practice middle cover **142** can be paper-thin to minimize any lump it creates when the binder **2** is open 360 degrees. FIG. **2**E shows the minimal resulting footprint of the binder **2** provided when cover **200** is open 360 degrees in a flat formation between forward loose-leaves **72**A and latter loose-leaves **72**B. For purpose (2) recited earlier in the description of the binder **1** shown in FIGS. **1**A-**1**F, the inner diameter of rings **46** is substantially greater than the thickness of the flat formation of cover **200** which equals the sum of the thickness of back cover **40** plus the thickness of front cover **144** plus twice the thickness of middle cover **142**.

Another advantage of the binder **2** of the present invention is more compact storage due to less wasted interior space of the binder. Since front cover **144** rests flatly on loose-leaves **72** when the binder is closed (FIGS. **2**A and **2**B), there is no air pocket between the top loose-leaf **72** and front cover **144**. This advantage is significant when considering the limited space of a briefcase or bookbag. The binder **2** of the present invention provides the advantages of an enveloping cover for the rings **46** while creating only a minimal footprint when opened approximately 180 degrees or 360 degrees.

FIGS. **3**A-**3**E

FIGS. **3**A-**3**E show perspective and sectional views of yet another preferred embodiment of a binder **3** of the present invention. The binder **3** comprises cover **300** and skeleton **50**. Cover **300** includes front cover **244**, middle cover **242**, and back cover **40**. The binder **3** comprises the same back cover **40** and skeleton **50** as the binder **1** shown in FIGS. **1**A-**1**L, but incorporates a different middle cover **242** and a different front cover **244**. Front cover **244** has loops **84** for receiving rings **46** so that it can be releasably bound by the rings **46**. Front cover **244** is connected to middle cover **242** in the same manner as the front cover **44** is connected to middle cover **42** in binder **1** as shown in FIGS. **1**A-**1**C. Creases **180**A, **180**B and **182** are preferably formed in middle cover **242** which is connected to back cover **40** in the same manner as the middle cover **42** of binder **1** is connected to back cover **40** as shown in FIGS. **1**A-**1**C.

Because front cover **244** of the binder **3** of the present invention rides loose-leaf on rings **46**, rings **46** constrain the motion of front cover **244**. When the binder **3** is opened 180 degrees and placed on a surface or when the binder **3** is opened 360 degrees, rings **46** constrain front cover **244** which in turn forces middle cover **242** to fold upon itself as shown in FIGS. **3**D-**3**E. To encourage smooth folding with a minimal resulting lump, creases **180**A, **180**B and **182** are preferably formed in middle cover **242**. When the binder **3** is opened 180 degrees, middle cover **242** tends to fold along crease **180**A and crease **180**B as shown in FIG. **3**D, but when the binder **3** is opened 360 degrees, middle cover **242** tends to fold along crease **182** as shown in FIG. **3**E. FIG. **3**E shows the minimal resulting footprint of binder **3** of the present invention when opened about 360 degrees. Because front cover **244** of the binder **3** rests on rings **46**, the binder provides the familiar, slightly triangular look-and-feel of known ring binders when closed, and also provides the advantages of an enveloping cover previously discussed with respect to the binder **1** of the present invention.

FIGS. **4**A-**4**D

FIGS. **4**A-**4**D show perspective and bottom views of an additional embodiment of a binder **4** of the present invention. The binder **4** comprises the same skeleton **50** as the binder **1** shown in FIGS. **1**A-**1**L and cover **400**. Cover **400** includes back cover **140**, middle cover **342**, and front cover **344**. Middle cover **342** has two small middle cover portions **342**A separated by a large middle cover portion **342**B which are all pivotable about spine **53** of skeleton **50**. Middle cover **342** has conduit **56**B to hold spine **53** of skeleton **50**. Middle cover portion **342**B pivots about spine **53** in a manner similar to how back cover **40** pivots about spine **53** in the binder **1** shown in FIGS. **1**A-**1**C. Slots **158**A-**158**C and margin supports **160**A-**160**D are defined by middle cover portion **342**B.

When the binder **4** is open 360 degrees (FIGS. **4**C and **4**D), skeleton **50** has been rotated within middle cover portion **342**B to allow for the extended range of motion similar to how skeleton **50** can be rotated within back cover **40** of the binder **1**. In both the 180-degree and 360-degree open positions, middle cover portion **342**B behaves like an extension of back cover **140**; the two provide one mostly planar surface to support loose-leaves **72**. This is possible because middle cover portion **342**B is the same thickness as back cover **140** except near the constricted neck or crease **140**A where middle cover portion **342**B and back cover **140** are connected or integrally formed (FIG. **4**B). The addition of writing-support pads **61**A and **61**B (see FIGS. **1**E and **1**F)

to the binder **4** could cover any crevices that might lead to puncturing loose-leaves **72** during the writing process.

Middle cover portions **342**A are connected to or integrally formed with an edge **344**A of front cover **344** with creases **344**B disposed therebetween. Middle cover portions **342**A pivot about respective ends of skeleton **50**. Middle cover portions **342**A do not interfere with the rotation of skeleton **50**. When the binder **4** is open 360 degrees, middle cover portions **342**A curve around middle cover **342**B to enable front cover **344** to lie flat against back cover **140** as shown in FIG. **4**D.

FIGS. **5**A-**5**B

FIGS. **5**A and **5**B show perspective and bottom views of yet an additional embodiment of a binder **5** of the present invention. The binder **5** comprises the same skeleton **50** as the binder **1** and cover **500**. Cover **500** includes back cover **1440**, middle cover **442**, and front cover **1044**. Middle cover **442** of the binder **5** comprises a base **442**A, a beam **86** disposed on base **442**A and creases **442**B and **442**C disposed at the respective junctures of the beam **86** with base **442**A. The spine **53** of skeleton **50** is rotatably disposed in conduit **56**A. Slots **258**A-**258**C are defined by middle cover **442**. Margin supports **260**A-**260**D are defined by beam **86** of middle cover **442**. The base **442**A of middle cover **442** and front cover **1044** are joined together at crease or fold **1044**A. The base **442**A and back cover **1440** are joined at crease or fold **1440**A.

Although skeleton **50** can rotate relative to middle cover **442**, only limited rotation is needed, the amount of rotation needed being influenced by the amount of loose-leaves **72** on one side of beam **86** of middle cover **442** compared with the other side. When the binder **5** is open 360 degrees (FIG. **5**B), the skeleton **50** need not rotate substantially because of the manner in which the base **442**A folds upon itself at creases **442**B and **442**C to enable front cover **1044** to lie flat against back cover **1440**. To enable middle cover **442**, back cover **1440** and front cover **1044** to form two parallel planar surfaces when the binder is open 360 degrees, the base **442**A of middle cover **442** as well as back cover **1440** and front cover **1044** are half as thick as beam **86** of middle cover **442**. Optional writing-support pads **61**A and **61**B cover crevices associated with folds **442**B and **442**C and slots **258**A-**258**C. When cover **500** is folded flatly open 360 degrees, beam **86** coincides with the near-ring edge of flatly-folded cover **500** and a portion of each ring **46** is rotatable about this edge.

FIGS. **6**A-**6**B

FIG. **6**A shows a perspective view of another embodiment of a binder **6** of the present invention comprising cover **600** and skeleton **50**. FIG. **6**B shows a perspective view of back cover **240**. Cover **600** includes back cover **240** and front cover **444**. The binder **6** of the present invention is similar to the binder **2** shown in FIGS. **2**A-**2**E except that the binder **6** has no enveloping middle cover **42**. Spine **53** of skeleton **50** is rotatably disposed in conduit **56** defined by back cover **240** such that spine **53** is a pivot of back cover **240**. Like the front cover **144** of the binder **2** shown in FIGS. **2**A-**2**E, front cover **444** of the binder **6** of the present invention defines holes **74**A for receiving rings **46** thereby enabling front cover **444** to be releasably bound by the rings **46**. Since there is no middle cover, the binder **6** of the present invention is more economical to manufacture and easier to open and close than similar binders having middle covers.

FIGS. **7**A-**7**B

FIGS. **7**A and **7**B are perspective and bottom views of yet an additional preferred embodiment of a binder **7** of the present invention. The binder **7** comprises cover **700** and skeleton **50**. Cover **700** includes back cover **340**, middle cover **542**, and front cover **44**. The binder **7** is a variation of the binder **1** of the present invention having middle cover **542**, which has been enlarged and is attached or integrally formed with the far edge **340**B of back cover **340**. Middle cover **542** is a bi-planar middle cover having middle cover portion **542**A and middle cover portion **542**B. The binder **7** of the present invention opens to 180 degrees similar to the binder **1** shown in FIGS. **1**A-**1**F, but opens differently to the 360 degree position. FIG. **7**B shows the binder **7** cover folded in a "Z" shape when opened 360 degrees and forward loose-leaves **72**A are sandwiched between back cover **340** and middle cover portion **542**B. When cover **700** is open 360 degrees, only back cover **340** of cover **700** is in flat formation between forward loose-leaves **72**A and latter loose-leaves **72**B. The inner diameter of rings **46** is substantially greater than the thickness of the flat formation of back cover **340** for a purpose (2) recited earlier in the description of the binder **1**.

FIG. **8**

FIG. **8** is a perspective view of yet another preferred embodiment of a binder **8** of the present invention. The binder **8** comprises cover **800** and skeleton **50**. Cover **800** includes back cover **440**, middle cover **642**, front cover **544**, and zipper **88**. The binder **8** is similar to the binder **7** shown in FIGS. **7**A-**7**B since back cover **440** connects to middle cover portion **642**B of the binder **8** much like back cover **340** connects to middle cover portion **542**B of the binder **7**. The binder **8**, however, also comprises a zipper **88** for securely enclosing back cover **440**, skeleton **0.50** and loose-leaves **72** (not shown) for improved storage and handling capability. Middle cover **642** has portions **642**A and **642**B. In addition, back cover **440** is releasably attached to middle cover portion **642**B via a loop **91** and hook **90** fastener. Hooks **90** are disposed on the back cover interior surface **440**N and loops **91** are disposed on a flap **78** attached to middle cover **642**B.

Since zipper **88** can become an encumbrance during usage, back cover **440** can be detached from the other cover sections of the binder. Spine **53** of skeleton **50** is disposed in conduit **56** of back cover **440**. When the back cover **440** is detached from middle cover portion **642**B, the binder **8** then resembles the binder **6** and can be used in a similar fashion bearing a minimal footprint when the forward loose-leaves **72**A are flipped back against back cover **440**. If zipper **88** is not an inconvenience, back cover **440** can be left attached to middle cover **642**, and forward loose-leaves **72**A can be flipped beneath back cover **440** by sandwiching them between back cover **440** and middle cover portion **642**B.

FIG. **9**

FIG. **9** shows a bottom view of an additional preferred embodiment of a binder **9** of the present invention. The binder **9** comprises cover **900** and skeleton **50**. Cover **900** includes back cover **540**, middle covers **742**A and **742**B, and front cover **644**. The binder **9** is similar to the binder **1** shown in FIGS. **1**A-**1**F but also comprises a dual-purpose fastener comprising loops **190** and hooks **192**A and **192**B and an extra middle cover **742**B. Middle cover **742**A and middle cover **742**B are disposed on opposite sides of the binder **9**. Crease or hinge **742**C is disposed between middle cover **742**A and front cover **644** while crease or hinge **742**D is disposed between front cover **644** and middle cover **742**B. Several rows of hooks **190** are disposed on back cover **540** which cooperate with the rows of loops **192**A and **192**B disposed on middle cover **742**B and front cover **644**, respec-

tively. The dual purpose fastener is composed of hooks **190** and alternative attachment positions at loops **192**A or loops **192**B.

When the binder **9** is closed, hooks **190** fasten to loops **192**A. When the binder **9** is opened 360 degrees as substantially shown in broken lines in FIG. **9**, front cover **644** is folded upon itself at crease **81** and hooks **190** fasten to loops **192**B to hold front cover **644** securely in place against back cover **540**. The addition of middle cover **742**B lets the binder **9** enclose rings **46** and inserted loose-leaves **72** on four sides when the binder **9** is closed and thus provides improved storage and handling. When the binder **9** is opened 360 degrees in a flat formation, front cover **644**, middle cover **742**A, and middle cover **742**B are disposed beneath the wide portion of back cover **540**, as divided by conduit **56**, to avoid interfering with the rotation of rings **46** and to minimize the footprint of the binder **9**. For purpose (2) recited earlier in the description of the binder **1** shown in FIGS. **1**A-**1**F, the inner diameter of rings **46** is substantially greater than the thickness of the flat formation of cover **900** which equals the sum of the thickness of back cover **540** plus twice the thickness of front cover **644**.

FIG. **10**

FIG. **10** shows a bottom view of yet another preferred embodiment of a binder **10** of the present invention. The binder **10** comprises cover **1000** and skeleton **50**. Cover **1000** includes back cover **640**, middle covers **842**A and **842**B, and front cover **744**. The binder **10** is similar to the binder **9** of FIG. **9** in that the binder **10** comprises a dual purpose fastener comprising hooks **290** and loops **292**A and **292**B and an extra middle cover segment **842**B. Crease or hinge **842**C is disposed between middle cover **842**A and front cover **744** while crease or hinge **842**D is disposed between front cover **744** and middle cover **842**B. Whereas middle cover **742**A, front cover **644**, and middle cover **742**B are rotated clockwise to a position underneath back cover **540** in the binder **9** in FIG. **9**, middle cover **842**B, front cover **744**, and middle cover **842**A of the binder **10** are rotated counterclockwise to a position underneath back cover **640**. Thus, the respective front covers **644** and **744** of the binders **9** and **10** open in opposite directions. In addition, the binder-**10**, like the binder **9**, encloses rings **46** and inserted loose-leaves on four sides when closed and uses dual-purpose hook-and-loop fasteners.

The fastener of the binder **10** comprises rows of hooks **290** disposed on back cover **640** and alternative attachment positions comprising rows of loops **292**A and **292**B disposed on middle cover **842**A and front cover **744**, respectively. When the binder **10** is closed, the rows of hooks **290** fasten to the rows of loops **292**A. When the binder **10** is opened 360 degrees as substantially shown in broken lines in FIG. **10**, front cover **744** is folded upon itself at crease **181** and the rows of hooks **290** fasten to the rows of loops **292**B to hold front cover **744** securely in place against back cover **640**.

FIG. **11**

FIG. **11** shows a bottom view of another preferred embodiment of a binder **11** of the present invention. The binder **11** comprises cover **1100** and skeleton **50**. Cover **1100** includes back cover **740**, middle covers **942**A and **942**B, and front cover **844**. Front cover **844** has releasably connecting portions **844**A and **844**B. The binder **11** shares similarities with the binder **9** of FIG. **9** and the binder **10** of FIG. **10**. The binder **11** of the present invention comprises a front-middle cover segment made up of front cover portion **844**A and middle cover **942**A that is permanently attached to back cover **740** near conduit **56**. The binder **11** also comprises a front-middle cover segment made up of front cover portion **844**B and middle cover **942**B that is permanently attached to the back cover **740**. Crease or hinge **942**C is disposed between middle cover **942**A and front cover portion **844**A while crease or hinge **942**D is disposed between front cover portion **844**B and middle cover **942**B. The two front-middle cover segments fasten together above back cover **740** when the binder **11** is closed or below back cover **740** when the binder **11** is open. The dual purpose hook-and-loop fastener of binder **11** comprises rows of hooks **390** and alternative attachment positions comprising rows of loops **392**A and **392**B.

When the binder **11** is closed, hooks **390** fasten to loops **392**A. When the binder **11** is opened 360 degrees as substantially shown in the broken lines of FIG. **11**, front cover portion **844**B is folded upon front cover portion **844**A and hooks **390** fasten to loops **392**B to hold front cover portion **844**A and front cover portion **844**B securely in place against back cover **740**. Like the binder **9** of FIG. **9** and the binder **10** of FIG. **10**, the binder **11** of the present invention encloses rings **46** and inserted loose-leaves **72** on four sides when closed and when open 360 degrees, middle cover **942**A, middle cover **942**B, front cover portion **844**A, and front cover portion **844**B are disposed beneath the wide portion of back cover **740**, as divided by conduit **56**, to avoid interfering with the rotation of rings **46**.

FIG. **12**

FIG. **12** shows a perspective view of yet an additional embodiment of a binder **12** of the present invention. The binder **12** comprises cover **1200** and skeleton **50**. Cover **1200** includes back cover **840**, middle cover **1042**, and front cover **44**. The binder **12** differs from most of the binders presented thus far in how middle cover **1042**, having portions **1042**A and **1042**B, avoids interfering with the rotation of rings **46** of skeleton **50** when forward loose-leaves **72**A are flipped beneath back cover **840** and latter loose-leaves **72**B. The middle cover portion **1042**B is connected to the back cover **840** with a hinge joint or fold **840**A. As shown in FIG. **12**, middle cover portion **1042**A is disposed between middle cover portion **1042**B and front cover **44**.

When loose-leaves **72** are to be flipped beneath back cover **840**, back cover **840** is pivoted up about fold **840**A which is preferably expandable to accommodate a large volume of loose-leaves **72** flipped underneath the back cover **840**. Forward loose-leaves **72**A are then flipped 360 degrees around back cover **840** causing the rotation of rings **46**. Back cover **840** is subsequently pivoted back toward its original position which sandwiches the forward loose-leaves **72**A between back cover **840** and middle cover portion **1042**B. To write on the reverse side of a loose-leaf, back cover **840** is flipped from the front side of middle cover portion **1042**B up against the back side thereof so that the reverse side of the desired loose-leaf is exposed. To minimize the footprint of the binder, front cover **44** can be folded against one side of middle cover portion **1042**B while back cover **840** is folded against the other side of middle cover portion **1042**B. Alternatively, front cover **44** can be sandwiched between middle cover portion **1042**B and back cover **840**.

FIGS. **13**A-**13**B

FIGS. **13**A and **13**B are perspective and bottom views, respectively, of an additional embodiment of a binder **13** of the present invention. The binder **13** comprises cover **1300** and skeleton **50**. Cover **1300** includes front cover **44**, middle cover **42**, and back cover **940**. Like the binder **1** of FIG. **1**A, middle cover **42** of the binder **13** attaches to back cover **940** at seam **66**. Back cover **940** has holes **74**B to enable it to be

releasably attached to rings **46** and has open conduit **156** which intersects holes **74**B. Spine **53** of skeleton **50** is not disposed within back cover **940**. However, when the binder **13** is open 360 degrees as shown in FIG. **13**B, the open conduit **156** defined by back cover **940** receives tube **54** of spine **53** to minimize or eliminate the lump caused by spine **53** so that back cover **940** can lie flat. Because back cover **940** hangs in a loose-leaf manner on rings **46** via holes **74**B, spine **53** and rings **46** are able to rotate relative to back cover **940** as needed when the binder **13** is open 360 degrees. Front cover **44** is preferably flexible enough to fold against itself to minimize the binder's footprint when open 360 degrees. When the binder **13** is closed, skeleton **50** is surrounded by back cover **940**, middle cover **42**, and front cover **44** so that rings **46** are not exposed thus making the binder **13** more attractive and easy to handle.

FIGS. **14**A-**14**C

FIGS. **14**A-**14**C are perspective and bottom views of a further preferred embodiment of a binder **14** of the present invention. The binder **14** comprises cover **1400** and skeleton **50**. Cover **1400** includes middle cover **142**, back cover **940**, and front cover **944**. Like the binder **2** of FIGS. **2**A-**2**E, middle cover **142** of the binder **14** attaches to back cover **940** and front cover **944** at seams **66** and **166**, respectively. Front cover **944** has holes **74**A to enable it to be releasably attached to rings **46** and has open conduit **256** which intersects holes **74**A. Likewise, back cover **940** has holes **74**B to enable it to be releasably attached to rings **46** and has open conduit **156** which intersects holes **74**B. Spine **53** of skeleton **50** is not disposed within back cover **940**. When the binder **14** is open 360 degrees as shown in FIG. **14**C, middle cover **142** folds flat along crease **82** and the open conduits **156** and **256** defined by the back cover **940** and front cover **944**, respectively, receive tube **54** of spine **53** to minimize or eliminate the lump caused by spine **53** so that back cover **940** can lie flat relative to front cover **944**. When the binder **14** is open 180 degrees as shown in FIG. **14**B, middle cover **142** tends to fold flat along crease **80**. When the binder **14** is open 360 degrees, spine **53** and rings **46** are able to rotate relative to front cover **944** and back cover **940** as needed depending upon the number of forward loose-leaves **72**A. When the binder **14** is closed, skeleton **50** is surrounded by back cover **940**, middle cover **142**, and front cover **944** so that rings **46** are not exposed thus making the binder **14** more attractive and easy to handle.

FIG. **15**

FIG. **15** is a bottom view of another preferred embodiment of a binder **15** of the present invention. The binder **15** comprises cover **1500** and skeleton **50**. Cover **1500** includes back cover **940**, front cover **944** and middle cover **1142**. Spine **53** of skeleton **50** is disposed within the middle cover **1142**. Skeleton **50** is able to rotate relative to back cover **940** because middle cover **1142** is preferably very thin and flexible and defines slots similar to the slots **258**A-**258**C of binder **5** shown in FIG. **5**A. When the binder **15** is open 360 degrees, thin and flexible middle cover **1142** folds flat and open conduits **156** and **256** receive spine **53** wrapped in part of middle cover **1142** to minimize or eliminate the lump caused by spine **53** so that back cover **940** can lie flat relative to front cover **944**.

FIG. **16** Description/Operation

FIG. **16**A is a perspective view of yet a further embodiment of a binder **16** of the present invention. The binder **16** comprises cover **1600** and skeleton **50**. Cover **1600** includes middle cover **42**, front cover **44**, and back cover **1040**. Back cover **1040** defines margin supports **360**A-**360**D divided by openings **358**A-**358**C. Bridges **62** span openings **358**A-**358**C at edge **1040**A of back cover **1040**. Bridges **62** have a smaller thickness than back cover **1040** to enable rings **46** to stand upright when the binder **16** is closed. Skeleton **50** and rings **46** are able to rotate relative to back cover **1040**. By enabling rings **46** to stand upright when the binder **16** is closed and permitting spine **53** and rings **46** to adequately rotate relative to back cover **940** when the binder **16** is open 360 degrees, openings **358**A-**358**C are nearly functionally equivalent to slots **58**A-**58**C of the binder **1** of FIG. **1**A.

FIG. **17**

FIG. **17** shows a perspective view of yet another preferred embodiment of a binder **17** of the present invention. The binder **17** comprises cover **1700** and skeleton **650**. Cover **1700** includes back cover **1140**, middle cover **1242**, and front cover **44**. The back cover **1140** defines slots **458**A and **458**B interspaced between margin supports **460**A-**460**C. As shown in FIG. **17**, spine **653** of skeleton **650** is disposed within conduit **56**B defined by the top edge **1140**A of back cover **1140**. Middle cover **1242** is disposed between back cover **1140** and front cover **44**. Loose-leaves are flipped over the top edge **1140**A of back cover **1140** while middle cover **1242** and front cover **44** are flipped around the side edge **1140**B of back cover **1140** in order to minimize the footprint of the binder **17**.

FIGS. **18**A-**18**B

FIGS. **18**A and **18**B are perspective and bottom views of another preferred embodiment of a binder **18** of the present invention. The binder **18** comprises cover **1800** and skeleton **50**. Cover **1800** includes front cover **44**, back cover **1240** and a bi-planar middle cover **1342**. Middle cover **1342** has middle cover portion **1342**A and middle cover portion **1342**B. As shown in FIG. **18**A, middle cover portion **1342**A is disposed between front cover **44** and middle cover portion **1342**B which is disposed between middle cover portion **1342**A and back cover **1240**. Crease **1342**C is preferably disposed between front cover **44** and middle cover portion **1342**A and crease **1342**D is preferably disposed between middle cover portion **1342**A and middle cover portion **1342**B. Middle cover portion **1342**B and back cover **1240** each define half of the total area of slots **558**A-**558**C interspaced between margin supports **560**A-**560**D. The perimeters of slots **558**A-**558**C are closed and completely surrounded by middle cover portion **1342**B and back cover **1240**.

Slots **558**A-**558**C are roughly O-shaped and exposed when the binder **18** is closed. The slots **558**A-**558**C fold in half along a fold **1342**E between middle cover portion **1342**B and back cover **1240** to become roughly U-shaped when front cover **44**, middle cover portion **1342**A and middle cover portion **1342**B are flipped back against back cover **1240** to minimize the footprint of the binder **18** as shown in FIG. **18**B and in dotted lines in FIG. **18**A. The folding of slots **558**A-**558**C prevents back cover **1240**, middle cover portion **1342**A and middle cover portion **1342**B from interfering with the rotation of rings **46** through the plane of back cover **1240**. When cover **1800** is folded flatly open 360 degrees, a portion of each ring **46** is rotatable around the near-ring edge **1240**A.

This construction of the binder **18** does not require the attachment of middle cover portion **1342**B to the wide portion of back cover **1240** as divided by conduit **56**. As shown in FIG. **18**B, one edge of middle cover portion **1342**B is connected to the edge **1240**A of back cover **1240** near margin supports **560**A-**560**D. The fold **1342**E adjacent to

back cover **1240** can be relocated to enable the edge of middle cover portion **1342**B to interface to the edge **1240**A of back cover **1240** on either side of back cover **1240** as divided by conduit **56**. Forward loose-leaves **72**A and latter loose-leaves **72**B and pads **61**A and **61**B lie parallel and flat when the binder **18** is open 360 degrees as shown in FIG. **18**B.

FIGS. **19**A-**19**C

FIGS. **19**A-**19**C are perspective and bottom views, respectively, of yet another preferred embodiment of a binder **19** of the present invention. The binder **19** comprises cover **1900** and skeleton **50**. Cover **1900** includes back cover **1340**, middle cover **1442** and front cover **44**. Middle cover **1442** has portions **1442**A-**1442**D. Back cover **1340** defines margin supports **660**A-**660**D and half of the area of each of the slots **658**A-**658**C, the other halves of which being defined by the middle cover portion **1442**B. Unlike the margin supports **560**A-**560**D of the binder **18** shown in FIGS. **18**A-**18**B, the margin supports **660**A-**660**D have the same thickness as the back cover **1340** and are shorter than margin supports **560**A-**560**D of the binder **18**. Like the slots **558**A-**558**C of the binder **18** shown in FIGS. **18**A-**18**B, slots **658**A-**658**C fold in half along the fold **282**A between middle cover portion **1442**B and back cover **1340** when the binder **19** is open 360 degrees. Slot cover **64**, having middle cover portions **1442**C and **1442**D, attaches to middle cover portion **1442**B and back cover **1340** and completely spans slots **658**A-**658**B to hide them when the binder **19** is closed as shown in FIG. **19**B. Slot cover **64** defines a crease **282**B between middle cover portions **1442**C and **1442**D which allows it to fold neatly away from slots **658**A-**658**C when the binder **19** is open 360 degrees.

FIGS. **20**A-**20**C

FIGS. **20**A-**20**C are a perspective and two bottom views, respectively, of yet another preferred embodiment of a binder **20** of the present invention. The binder **20** comprises cover **2000** and skeleton **50**. Cover **2000** includes front cover **1044**, middle cover **1542**, and back cover **1440**. Middle cover **1542** has middle cover portions **1542**A-**1542**F that are connected together to define conduit **356**. Skeleton **50** is disposed within conduit **356** such that rings **46** are looped through middle cover holes **74**C-**74**D. Conduit **356** changes shape as front cover **1044** is opened relative to back cover **1440**. Middle cover portions **1542**A-**1542**D snugly enwrap spine **53** as the binder **20** is opened 360 degrees as seen in FIG. **20**C. Spine **53** is a pivot about which cover **2000** can rotate when cover **2000** is flatly-folded open 360 degrees. As the binder **20** is opened from its closed position to its 360 degree position, front cover **1044** and middle cover portion **1542**A rotate about fold **382**A and spine **53** until they abut back cover **1440** and middle cover portion **1542**D, respectively. When cover **2000** is folded flatly open 360 degrees, a transient near-ring edge coinciding with fold **382**A exists and a portion of each ring **46** is rotatable about this edge.

Middle cover portions **1542**A and **1542**D, front cover portion **1044**A and back cover portion **1440**A are preferably the same thickness so as to form parallel planar surfaces when binder **20** is open 360 degrees. Middle cover portions **1542**B and **1542**C have reduced thickness relative to middle cover portions **1542**A and **1542**D to accommodate spine **53** when the binder **20** is open 360 degrees. Front cover **1044** has front cover portions **1044**A and **1044**B. Back cover **1440** has back cover portions **1440**A and **1440**B. The thickness of front cover portion **1044**B and back cover portion **1440**B is less than the thickness of front cover portion **1044**A and back cover portion **1440**A, respectively, so that a channel **65** is formed when the binder **20** is open 360 degrees as seen in FIG. **20**C. Channel **65** accommodates ring-hole cover **164** that folds neatly via crease **382**B into channel **65** as the binder **20** is opened 360 degrees. Ring-hole cover **164** includes middle cover portions **1542**E-**1542**F and hides rings **46** and middle cover holes **74**C-**74**D when the binder **20** is in its closed position as seen in FIG. **20**B to give the binder **20** the aesthetic appearance and handling of a bound book. The binder **20** is similar to the binder **5** in that the thickness of the folded middle cover **1542** is substantially equal to the sum of the thickness of front cover **1044** and back cover **1440** as seen when the binder is open 360 degrees in FIG. **20**C.

FIGS. **21**A-**21**B

FIGS. **21**A-**21**B are bottom views of yet another preferred embodiment of a binder **21** of the present invention. The binder **21** comprises cover **2100** and skeleton **50**. Cover **2100** includes front cover **1044**, middle cover **1642** and back cover **1440**. Middle cover **1642** has middle cover portions **1642**A-**1642**D. Middle cover portion **1642**B contains conduit **456**B. Spine **53** of skeleton **50** is disposed within conduit **456**B and creates middle cover lump **67** in middle cover portion **1642**B. Middle cover portion **1642**A contains conduit **456**A which receives middle cover-lump **67** when the binder **21** is open 360 degrees as shown in FIG. **21**B. Rings **46** are looped through middle covers **1642**A-**1642**B of the binder **21** in a similar manner as rings **46** are looped through middle covers **1542**A-**1542**B of the binder **20**.

As the binder **21** is opened from its closed position in FIG. **21**A to its 360 degree position in FIG. **21**B, front cover **1044** and middle cover portion **1642**A rotate about fold **482**A until they abut back cover **1440** and middle cover **1642**B, respectively, to minimize the footprint of the binder **21**. Middle cover **1642**A, middle cover **1642**B, front cover **1044** and back cover **1440** form parallel planar surfaces when the binder **21** is open 360 degrees. Front cover **1044** has front cover portions **1044**A and **1044**B. Back cover **1440** has back cover portions **1440**A and **1440**B. The thickness of front cover portions **1044**B and back cover portions **1440**B is less than the thickness of front cover portions **1044**A and back cover portions **1440**A, respectively, so that a channel **165** is formed when the binder **21** is open 360 degrees as seen in FIG. **21**B. Channel **165** accommodates ring-hole cover **264** that folds neatly via crease **482**B into channel **165** as the binder **21** is opened 360 degrees. Ring-hole cover **264**, having middle cover portions **1642**C-**1642**D, gives the binder **21** the aesthetic appearance and handling of a bound book when the binder **21** is closed as seen in FIG. **21**A. The binder **21** is similar to the binder **5** and the binder **20** in that the thickness of the folded middle cover **1642** is substantially equal to the sum of the thickness of front cover **1044** and back cover **1440** as seen when the binder **21** is open 360 degrees in FIG. **21**B.

FIGS. **22**A-**22**B

FIGS. **22**A-**22**B are bottom views of yet another preferred embodiment of a binder **22** of the present invention. The binder **22** comprises cover **2200** and skeleton **50**. Cover **2200** includes front cover **1044**, middle cover **1742** and back cover **1540**. Middle cover **1742** includes middle cover portions **1742**A-**1742**D. Rings **46** are looped through middle cover portions **1742**A-**1742**B of the binder **22** in a similar manner as rings **46** are looped through middle cover portions **1542**A-**1542**B of the binder **20**. However, middle cover portions **1742**A-**1742**B are releasably bound to rings **46** in the same manner as loose-leaves **72** are releasably bound to rings **46**.

As the binder **22** is opened from its closed position in FIG. **22**A to its 360 degree open position in FIG. **22**B, front cover **1044** and middle cover portion **1742**A rotate about fold **582**A until they abut back cover **1540** and middle cover **1742**B, respectively, to minimize the footprint of the binder **22**. Middle cover portion **1742**A, middle cover portion **1742**B, front cover **1044**, writing-support pad **161** and back cover **1540** form parallel planar surfaces when the binder **22** is open 360 degrees. Writing-support pad **161** has portions **161**A-**161**B where **161**B is of reduced thickness relative to **161**A to hinder spine **53** from causing a lump in the writing surface. Front cover **1044** has front cover portions **1044**A and **1044**B. Back cover **1540** includes back cover portions **1540**A-C. The thickness of back cover portion **1540**C is reduced relative to back cover portion **1540**B so as to accommodate spine **53** when the binder **22** is in the closed position. The thickness of front cover portion **1044**B and back cover portion **1540**B is less than the thickness of front cover portion **1044**A and back cover portion **1540**A, respectively, so that a channel **265** is formed when binder **22** is open 360 degrees as seen in FIG. **22**B. Channel **265** accommodates ring-hole cover **364** that folds along crease **582**B into channel **265** as the binder **22** is opened 360 degrees. Ring-hole cover **364** has middle cover portions **1742**C-**1742**D and gives the binder **22** the aesthetic appearance and handling of a bound book when the binder **22** is closed as seen in FIG. **22**A.

FIGS. **23**A-**23**E

FIGS. **23**A-**23**E are bottom views of yet another preferred embodiment of a binder **23** of the present invention. The binder **23** comprises skeleton **550**, one or more staple-thin fasteners **68** and cover **2300**. Cover **2300** includes front cover **1144**, middle cover **1842** and back cover **1640**. Middle cover **1842** has middle cover portions **1842**A-**1842**C. Skeleton **550** includes spine **553** and rings **746**.

Conventional spine **553** has an arc-shaped cross-section and has a switching element to simultaneously open and close rings **746**. Skeleton **550** is fixed to middle cover portion **1842**B via one or more staple-thin fasteners **68**. Middle cover portion **1842**B is of reduced thickness relative to middle cover portion **1842**A and middle cover portion **1842**C preferably creating recess **71** to contain spine **553**. Recess **71** aids in providing a flat writing surface when the binder **23** is open 180 degrees by lowering spine **553** partially into the plane of front cover **1144** and back cover **1640**. The reduced thickness of middle cover portion **1842**B also facilitates its greater flexibility relative to middle cover portions **1842**A and **1842**C enabling it to have a small radius of curvature illustrated in FIGS. **23**C-**23**E such that middle cover portion **1842**A is able to lie flatly against middle cover portion **1842**C. Furthermore, fastener **68** is purposefully staple-thin so as not to hinder the folding of middle cover **1842**. The folding of middle cover **1842** creates a transient near-ring edge **73** in cover **2300**. To facilitate the flipping of front cover **1144** and one or more forward loose-leaves **72**A 360 degrees such that they lie parallel to back cover **1640** and latter loose-leaves **72**B, skeleton **550** must be able to incrementally rotate in a stable and controlled manner relative to front cover **1144** and back cover **1640**. Because skeleton **550** is fastened to middle cover portion **1842**B, it cannot freely rotate relative to middle cover portion **1842**B; but skeleton **550** rotates relative to front cover **1144** and back cover **1640** via the flexibility of middle cover portion **1842**B. As illustrated in FIGS. **23**C-**23**E, skeleton **550** is not strongly biased to a particular angular position when front cover **1144** is flipped 360 degree beneath back cover **1640** and can incrementally rotate as needed depending upon the number of forward loose-leaves **72**A to be flipped beneath back cover **1640**; back cover **1640** and middle cover portion **1842**A slide against front cover **1144** and middle cover portion **1842**B to facilitate the amount of necessary rotation of skeleton **550**. Staple-thin fasteners **68** can be affixed loosely to allow freer rotation of skeleton **550** relative to middle cover portion **1842**B. To provide a flat writing surface, writing-support pads **61**A and **61**B blanket crevices **75**A-**75**B between spine **553** and middle cover portions **1842**A and **1842**C, respectively.

When cover **2300** is open 360 degrees, spine **553** is rotatably disposed on middle cover **1842** such that rings **746** of skeleton **550** can rotate about near-ring edge **73** of the flatly-folded cover **2300**. Since spine **553** is riveted to cover **2300**, it is not a pivot about which cover **2300** can rotate. However, when the binder **23** is flatly folded open 360 degrees, the flexibility and small radius of curvature of middle cover **1842** enable spine **553** to be substantially axially disposed relative to the rotation of rings **746** and the oppositely rotating front cover **1144** and back cover **1640**. All points of front cover **1144**, back cover **1640**, and rings **746** rotate through substantially the same size angle about spine **553** as most of the flatly-folded cover **2300** rotates about spine **553**. In this case, front cover **1144** and back cover **1640** share the same angular rotation about spine **553** even though front cover **1144** and back cover **1640** slide radially in opposite directions relative to spine **553**.

Front cover **1144** comprises front cover portions **1144**A-**1144**B and back cover **1640** comprises back cover portions **1640**A-**1640**B. Front cover portion **1144**B is of reduced thickness enabling the folding of front cover portion **1144**A beneath middle cover **1842** and back cover **1640** as shown in FIG. **23**B. Likewise, back cover portion **1640**B is of reduced thickness enabling the folding of back cover portion **1640**A beneath middle cover **1842** and front cover **1144**.

The binder **23** is similar to the binder **5** in that the thickness of the folded middle cover **1842** is substantially equal to the sum of the thickness of front cover **1144** and back cover **1640** as seen when the binder is open 360 degrees in FIGS. **23**C-**23**E. Moreover, the LSCPL of spine **553** is less than or equal to sum of the thickness of front cover **1144** and back cover **1640** which minimizes or eliminates any potential lump caused by spine **553** when it is positioned between forward loose-leaves **72**A and latter loose-leaves **72**B when the binder **23** is open 360 degrees. Also the major diameter of the rings **746** is much larger than the LSCPL dimension of spine **553**. The many elements of the binder **23** described in detail above work in concert to enable front cover **1144** and forward loose-leaves **72**A to lie flat and parallel to back cover **1640** and latter loose-leaves **72**B when the binder **23** is opened 360 degrees.

As the binder **23** is opened from its closed position to its 360 degree position, front cover **1144** and middle cover portion **1842**A rotate about middle cover portion **1842**B until they abut back cover **1640** and middle cover portion **1842**C, respectively, as shown in FIGS. **23**C-**23**E. Middle cover portion **1842**A, middle cover portion **1842**C, front cover portion **1144**A and back cover portion **1640**A are preferably the same thickness to form parallel planar surfaces when the binder **23** is open 360 degrees.

Partially elliptical rings **746** have a major diameter that is greater than or equal to the sum of their cut-off minor diameter plus the LSCPL of spine **553**. This enables the loose-leaf capacity of rings **746** when the binder **23** is open

360 degrees to be greater than or equal to the capacity of the binder **23** when it is open 180 degrees and is typically loaded.

FIGS. **24**A-**24**C

FIGS. **24**A-**24**C are bottom views of yet another preferred embodiment of a binder **24** of the present invention. The binder **24** comprises skeleton **550**, one or more round rivets **69**, and cover **2400**. Cover **2400** includes front cover **1144**, middle cover **1942**, and back cover **1640**. The binder **24** comprises the same skeleton **550**, front cover **1144** and back cover **1640** as the binder **23** shown in FIGS. **23**A-**23**E, but incorporates a different middle cover **1942** and round rivets **69** in place of middle cover **1842** and staple-thin fasteners **68** of the binder **23**. Skeleton **550** is fixed to middle cover **1942** via round rivets **69**. Middle cover **1942** includes middle cover portions **1942**A-**1942**C. Like middle cover portion **1842**B, middle cover portion **1942**B is of reduced thickness relative to middle cover portions **1942**A and **1942**C. But middle cover portion **1942**B of the binder **24** is longer and thinner than middle cover portion **1842**B of the binder **23** which enables middle cover portion **1942**B to accommodate round rivets **69** as well as staple-thin fasteners **68**. Because middle cover portion **1942**B is thin and flexible, middle cover portion **1942**B prevents round rivets **69** from causing a lump between middle cover portions **1942**A and **1942**C by providing the extra room that round rivets **69** require relative to staple-thin fasteners **68**. Middle cover portion **1942**B is also shaped so as to deter the edges of round rivets **69** from cutting into and damaging middle cover **1942** during repeated usage of the binder **24**. To provide a flat writing surface, writing-support pads **61**A and **61**B blanket crevices **175**A-**175**B between spine **553** and middle cover portions **1942**A and **1942**C, respectively.

FIGS. **25**A-**25**B

FIGS. **25**A-**25**B are bottom views of yet another preferred embodiment of a binder **25** of the present invention. The binder **25** comprises skeleton **550**, one or more round rivets **69**, and cover **2500**. Cover **2500** includes front cover **44**, middle cover **2042**, and back cover **1740**. The binder **25** has the same skeleton **550** as the binder **23** shown in FIGS. **23**A-**23**E. Back cover **1740** has portions **1740**A-**1740**D. Skeleton **550** is fixed to back cover **1740** via round rivets **69**. To facilitate the flipping of front cover **44** and one or more forward loose-leaves **72**A 360 degrees such that they lie parallel to back cover **1740** and latter loose-leaves **72**B, skeleton **550** must be able to incrementally rotate in a stable and controlled manner relative to front cover **44** and back cover **1740**. Because skeleton **550** is riveted to back cover portion **1740**D, it cannot freely rotate relative to back cover portion **1740**D; but skeleton **550** rotates relative to front cover **44** and most of back cover **1740** via a hinge joint **76** between back cover portions **1740**D and **1740**C. Thus rings **746** are rotatable about a near-ring edge of back cover portion **1740**C. Skeleton **550** is not strongly biased to a particular angular position when front cover **44** is flipped 360 degrees beneath back cover **1740**, as illustrated in FIG. **25**B. Skeleton **550** can incrementally rotate as needed depending upon the number of forward loose-leaves **72**A to be flipped beneath back cover **1740**. Spine **553** is substantially axially disposed relative to opposite rotations of large back cover portion **1740**A and rings **46**. Middle cover **2042** has middle cover portions **2042**A-**2042**B and is attached to the wide side of back cover **1740** as divided by hinge joint **76** such that middle cover **2042** does not interfere with the rotation of skeleton **550** as front cover **44** and forward loose-leaves **72**A are flipped beneath back cover portions **1740**A-**1740**C.

Back covers portions **1740**C-**1740**D are of reduced thickness relative to back cover portion **1740**A which aids in providing a flat writing surface when the binder **25** is open 180 degrees by lowering spine **553** partially into the plane of back cover portion **1740**A. Back cover portion **1740**B is a small wedge-shaped segment connecting back cover portion **1740**C with back cover portion **1740**A. To provide a flat writing surface, writing-support pads **61**A and **61**B blanket crevices **275**A-**275**B between spine **553** and back cover portion **1740**A as illustrated in FIG. **25**B. Rivet groove **70** accommodates round rivet **69** when the binder **25** is in its closed position.

The binder **25** is similar to other embodiments of the present invention in that the LSCPL of spine **553** is less than or equal to sum of the thickness of front cover **44** and back cover **1740**A which minimizes or eliminates any potential lump caused by spine **553** when it is positioned between forward loose-leaves **72**A and latter loose-leaves **72**B when binder **25** is open 360 degrees. The binder **25** is also similar to the binder **1** in the manner that its middle cover **2042** is attached to its back cover **1740** to avoid interfering with the rotation of its skeleton **550**.

FIGS. **26**A-**26**C

FIGS. **26**A-**26**C show perspective, bottom and front views, respectively, of another preferred embodiment of a skeleton **150** of the binder of the present invention with detailed sectional portions of the synchronized switching element **151** thereof. In this embodiment of a skeleton **150**, cable **34** and tube **154** serve as the first and second connective elements, respectively, of synchronized switching element **151**. Rings **146** have ring segments **146**A-**146**C. Ring segments **146**A and ring segments **146**B are attached to tube **154** via weld, braze, or other appropriate means. Ring segments **146**B are hollow and their conduits **33** are constricted at one end by ledges or stops **132**. Conduit **33** houses spring **131** and receives part of ring segment **146**C. Stop **132** supports one end of spring **131** which constantly exerts a pushing force on ring segments **146**C both when skeleton **150** is open or closed.

In the closed position shown in FIG. **26**B, ring segments **146**C are pressed up against ring segments **146**A. Ring segments **146**C are capable, albeit constrained, to slide into ring segments **146**B which have the same curvature as ring segments **146**C. One end of ring segment **146**C defines an opening or needle eye **30**. Cable **34** comprises a trunk segment **34**A with three branch segments **34**B with each branch segment **34**B terminating with a loop **35**. Each conduit **33**, spring **131**, and stop **132** of the three ring segments **146**B of skeleton **150** are threaded by one of the branch segments **34**B of cable **34**. Each of ring segments **146**C is attached to cable **34** via a chain link between its needle eye **30** and a corresponding loop **35**.

FIG. **26**C shows the trunk-end of cable **34** attaches to pull-lock **38** which has knob **38**A. Pull-lock **38** is also attached to spring **36**. Spring **36** is extended to its lock position through slot **37** when skeleton **150** is locked open as seen in FIG. **26**A and as shown in broken lines of FIG. **26**C. FIGS. **26**A-**26**C show rings **146** to be circular. However, other ring shapes are possible as long as portions of ring segments **146**B and **146**C have the same curvature to enable retraction of ring segment **146**C into ring segment **146**B.

To open skeleton **150**, knob **38**A of pull-lock **38** is pulled away from tube **154** against the resistance of springs **131** until spring **36** spring locks into slot **37**. Meanwhile, pull-lock **38** pulls cable **34** which simultaneously retracts the three ring segments **146**C into the three ring segments **146**B to lock open all three rings **146**.

To close skeleton **150**, spring **36** is pressed in to release cable **34** which is dragged to its closed position by springs **131** which also extend the ring segments **146**C out of the ring segments **146**B until they hit up against the ring segments **146**A. Rings **146** stay closed because of the compression loading of springs **13.1**.

FIGS. **27**A-**27**B

FIGS. **27**A and **27**B show perspective views of a further preferred embodiment of a skeleton **250** of the binder of the present invention, with detailed sectional portions showing the synchronized switching element **251** of skeleton **250**. Ring segments **46**A are attached to rod **252** via weld, braze or other appropriate means. Similarly, ring segments **46**B are attached to tube **254**. When rod **252** is assembled within tube **254**, the spaced ring segments **46**A protrude through similarly spaced slots **55** of tube **254**. Tube **254** rotates about rod **252** through a limited angle to open and close ring segments **46**A relative to ring segments **46**B. Cylindrical flanges **77** maintain the longitudinal axis of rod **252** coincident with the longitudinal axis of tube **254**.

Synchronized switching element **251** includes spring **97** which is torsionally loaded when skeleton **250** is either open or closed and which is always resisting the opening of ring segments **46**A relative to ring segments **46**B. Catch **98**A which is attached to, or integrally formed as a part of, rod **252** constrains one arm of torsion spring **97**, while catch **98**B which is attached to, or integrally formed as a part of, tube **254** constrains the other arm of torsion spring **97**. Ledge **27**A extends from rod **252** while ledge **27**B extends from tube **254**. Both ledge **27**A and ledge **27**B are in contact with wedge **26** which is able to longitudinally slide along, as well as rotate around, the rod **252**. Wedge **26** is kept in contact with ledge **27**A and ledge **27**B via push rod **76** and torsion spring **97**. Push rod **76** and push button **39** are on opposite ends of a two-state mechanical switch common to ball-point pens for extending and retracting the ball-point. In ball-point pens, this two-state mechanical switch depends upon the constant resistance of a compression spring; in skeleton **250**, the constant resistance is supplied by torsion spring **97** via linkages (rod **252** and ledges **27**A and **27**B) to wedge **26**.

When push rod **76** is in the retracted position shown in FIG. **27**A, push button **39** is up and the rings are closed. When push button **39** is depressed or clicked down, push rod **76** is pushed and locked into its extended position. As push rod **76** is extended, it pushes on wedge **26** which angularly separates ledge **27**A from ledge **27**B which in turn forces rod **252** to rotate relative to tube **254** which causes ring segments **46**A to open relative to ring segments **46**B. Since push rod **76** is locked in place, ring segments **46**A remained locked open relative to ring segments **46**B as shown in FIG. **27**B. When push button **39** is depressed a second time, it unlocks push rod **76** from its extended position allowing torsion spring **97** to act upon rod **252** and tube **254** to close ring segments **46**A and ring segments **46**B as well as ledge **27**A and ledge **27**B as shown in FIG. **27**A. As ledge **27**A and ledge **27**B close, they force wedge **26** and push rod **76** to their closed and retracted positions, respectively, and push rod **76** forces push button **39** to its original up position. Although FIGS. **27**A and **27**B show some components of synchronized switching element **251** to be disposed on one end of skeleton **250**, corresponding mirror-image components of the synchronized switching element **251** may be disposed on the opposite end of skeleton **250** to provide more balanced operation.

FIGS. **28**A-**28**B

FIGS. **28**A and **28**B show perspective views of yet another preferred embodiment of skeleton **350** of the binder of the present invention, with detailed sectional portions showing the synchronized switching element **351** of skeleton **350**. Ring segments **46**A are attached to rod **352** via weld, braze or other appropriate means. Similarly, ring segments **46**B are attached to tube **354**. When rod **352** is assembled within tube **354**, the spaced ring segments **46**A protrude through similarly spaced slots **55** of tube **354**. Tube **354** rotates about rod **352** through a limited angle to open and close ring segments **46**A relative to ring segments **46**B. Synchronized switching element **351** includes spring **97** which is torsionally loaded when skeleton **350** is either open or closed and which is always resisting the opening of ring segments **46**A relative to ring segments **46**B. Catch **98**A which is attached to, or integrally formed with, rod **352** constrains one arm of torsion spring **97** while catch **98**B which is attached to, or integral with, tube **354** constrains the other arm of torsion spring **97**. Stop **32** protrudes from the inner wall of tube **354**. Spring **31** which loosely spirals around rod **352** is compressed between stop **32** and push button **139**. Spring **31** always has some amount of compression loading, albeit less when skeleton **350** is in the open state. Cylindrical, hollow push button **139** can slide longitudinally along rod **352** a limited distance like a sleeve on a rod. Tooth **93**, which protrudes from the inner wall of push button **139** into groove **94** of rod **352**, constrains push button **139** to rotate in sync with rod **352**. Pawl **95** protrudes from the outer wall of push button **139** and slides along the limited path of ledge **96**. Pawl **95** constrains the longitudinal and rotational motion of push button **139**. Ledge **96** protrudes from the inner wall of tube **354**. Stop **32** also acts as a flange to maintain the longitudinal axis of rod **352** coincident with the longitudinal axis of tube **354**.

To open skeleton **350**, ring segments **46**A and ring segments **46**B are pulled apart. This action causes rod **352** to rotate relative to tube **354** and is resisted by torsion spring **97**. As rod **352** rotates relative to tube **354**, push button **139** is constrained to rotate in sync because of its tooth **93** within groove **94**, but push button **139** is also pushed longitudinally towards rod **352** by a spiral section of ledge **96** that acts on pawl **0.95**. The movement of push button **139** towards rod **352** causes the compression of spring **31** between push button **139** and stop **32**. As rod **352** forces pawl **95** to rotate, pawl **95** is forced out of slot **96**A, slides over tooth **96**C of ledge **96** and is forced into slot **96**B by spring **31** thereby locking push button **139** in its extended state which corresponds to the open position of skeleton **350** as shown in FIG. **28**B. When pawl **95** is disposed in slot **96**B, the user can release the rings **46** because pawl **95** is obstructed from rotating back by the tooth **96**C of ledge **96** and thus pawl **95** is able to resist the torsional closing force of torsion spring **97**.

To close skeleton **350**, push button **139** is pressed towards rod **352** against the resistance of spring **31**. This action causes pawl **95** to move out of slot **96**B and slide over tooth **96**C of ledge **96** where the pawl **95** is then forced into slot **96**A by spring **31** which allows torsion spring **97** to act to close the rings **46** of skeleton **350**. Torsion spring **97** twists catch **98**A relative to catch **98**B causing rod **352** to rotate relative to tube **354** until ring segments **46**A are closed

against ring segments **46**B. Although, FIGS. **28**A and **28**B show some components of synchronized switching element **351** to be disposed on one end of skeleton **350**, corresponding mirror-image components of synchronized switching element **351** may be disposed on the opposite end of skeleton **350** to provide more stable operation.

Skeleton embodiments **150**, **250** and **350** can be used in place of skeleton embodiment **50** in each and every of the preferred embodiments that incorporate skeleton **50** of the present invention via a small modification to the covers to allow access to the actuators: knob **38**A, button **39** and button **139**. This modification is simply a hole in the top and bottom edges of the covers of the respective embodiments of the binders of the present invention.

FIGS. **29**A-**29**C

FIGS. **29**A-**29**B show perspective and side views, respectively, of a further preferred embodiment of a skeleton **450** of the binder of the present invention. FIG. **29**C shows a side cross-sectional view of the rod **452** of skeleton **450**. Skeleton **450** comprises three rings **246** and rod **452**. FIG. **29**C shows that rings **246** comprise ring segments **246**A and ring segments **246**B the ends of which define tabs **47** and slots **48**, respectively. Also, nubs **49**A and nubs **49**B protrude from ring segments **246**A and ring segments **246**B, respectively. Ring segments **246**A have a small hollow free end into which tabs **47** can be inserted. Skeleton **450** is assembled by inserting ring segments **246**A through holes **57** defined by skeleton **450** and sliding the rings **246** so that only nubs **49**A and not nubs **49**B pass through light-bulb shaped hole **57**. Then each ring **246** is rotated about the portion of ring-**246** disposed within hole **57** to stand rings **246** upright relative to rod **452** as shown in FIG. **29**A.

Each ring **246** is opened or closed individually. To open ring **246**, tab **47** is pushed down relative to slot **48** and pulled out of the hollow tip of ring segment **246**A to unhitch tabs **47** from slots **48**. The body of ring **246** acts like a spring which is free of tension or compression in its open position as shown in FIG. **29**B. To close rings **246**, force is exerted to insert tabs **47** of ring segments **246**B into slots **48** of ring segments **246**A until the tabs **47** are hitched in slots **48** and locked therein by the spring loading of rings **246** that exists when rings **246** are in the closed position. Since the front covers of many of the preferred embodiments of the binders of the present invention often rests on the rings of the skeleton, the rotation of the tops of rings **246** towards skeleton **450** can help minimize binder thickness when the binder is closed.

FIGS. **30**A-**30**F

FIG. **30**A is the bottom view of another preferred embodiment of a ring component **346** of the present invention and FIGS. **30**B-**30**F are bottom views of binder **1**, shown in FIGS. **1**A-**1**L, with its skeleton **50** incorporating rings **346** in placed of rings **46**. FIGS. **30**B-**30**F show rings **346** in different positions as varying numbers of forward loose-leaves **72**A are flipped beneath back cover **40**.

Ring **346** comprises ring segments **346**A-**346**B and the portion of spine **53** intersected by ring segments **346**A-**346**B. Ring segment **346**A has ring segments **346**P-**346**Q and ring segment **346**B has ring segments **346**R-**346**S. The shape of ring **346** is a cut-off ellipse that is derived from an ellipse and chord P**1**Q**1** parallel to its major axis. Rings segments **346**Q and **346**S coincide with chord P**1**Q**1**. The ellipse's minor axis bisects chord P**1**Q**1** on one side of the major axis and bisects spine **53** on the opposite side of the major axis.

Distance A**1** is the upright-ring loose-leaf capacity measured from the interior surface **40**N of back cover **40** to point Q**1** when rings **346** are upright as shown in FIGS. **30**A and **30**B. When rings **346** are upright, ring segments **346**Q and **346**S are parallel to back cover **40**. Distance E**1** is the length of the major axis of the interior cut-off ellipse of ring **346** as shown in FIG. **30**A. FIGS. **30**C-**30**F show that back cover **40** and front cover **44** occupy additional interior ring space when forward loose-leaves **72**A are flipped 360 degrees beneath back cover **40** that they do not occupy when rings **346** are upright as in FIG. **30**B. The space occupied by back cover **40** and front cover **44** is measured by distance D**1** as shown in FIG. **30**D. Distance (B**1**+C**1**) measures the loose-leaf capacity of the rings when spine **53** is rotated 90 degrees as shown in FIG. **30**D.

Cover **100** of FIGS. **30**B-**30**F is preferably loaded and unloaded with loose-leaves when cover **100** is open 180 degrees and rings **346** are substantially upright. Therefore, the height of the upright rings **346** determines the capacity of rings **346** as users will fill the rings up to the under surface of the ring segments **346**Q and **346**S. For convenient operation of the binder, it is preferred that the upright-ring loose-leaf capacity be less than or equal to the loose-leaf capacity when the spine **53** is rotated to other positions shown in FIGS. **30**C-**30**F. To enable rings **346** to have less or the same loose-leaf capacity when rings **346** are upright as when spine **53** and rings **346** are rotated 90 degrees from upright, the following equation must be satisfied:

$$A1 \leq B1 + C1 \qquad \text{equation 1}$$

From FIG. **30**D, major axis distance E**1** equals the sum of distances B**1**, C**1**, and D**1**.

$$E1 = B1 + C1 + D1 \qquad \text{equation 2}$$

Substituting equation 2 into equation 1 and rearranging terms yields:

$$E1 \geq A1 + D1$$

For a given thickness of back and front cover as measured by distance D**1** and for a given upright-ring loose-leaf capacity A**1**, the length of the major axis E**1** of ring **346** can be calculated so that the loose-leaf capacity of rings **346** in the upright position is greater than or equal to the loose-leaf capacity of rings **346** when spine **53** and loose-leaf ring **346** are rotated 90 degrees from upright. More stringently, chord P**1**Q**1** can cut the elliptical curve of rings **346** at a position such that the upright-ring loose-leaf capacity is less than or equal to the loose-leaf capacity of rings **346** for the range of spine rotation illustrated in FIGS. **30**B-**30**F. The preferred length of E**1** is its maximum value that satisfies this more stringent constraint.

Completely elliptical rings immediately decrease in loose-leaf capacity as spine **53** begins to rotate and ring prongs enter the plane of the back cover **40** of binder **1**. Cut-off elliptical rings **346** do not share this problem because point Q**1** which determines upright-ring capacity of rings **346** extends farther from back cover **40** as spine **53** rotates counterclockwise from upright until point Q**1** is directly over spine **53**.

FIGS. **31**A-**31**F

FIG. **31**A is the bottom view of another preferred embodiment of a ring component **446** of the present invention and FIGS. **31**B-**31**F are bottom views of binder **1**, shown in FIGS. **1**A-**1**L, with its skeleton **50** incorporating rings **446** in placed of rings **46**. FIGS. **31**B-**31**F show rings **446** in different positions as varying numbers of forward loose-leaves **72**A are flipped beneath back cover **40**. Ring **446**

comprises ring segments **446**A-**446**B and the portion of spine **53** intersected by ring segments **446**A-**446**B. Ring segment **446**A comprises ring segments **446**P-**446**R and ring segment **446**B comprises ring segments **446**S-**446**U. The shape of ring **446** is a cut-off ellipse similar to ring **346** with additional chord ring segments **446**P and **446**S parallel to the major axis of the elliptical curve of rings **446**. When binder **1** of FIGS. **31**A-**31**F is open 180 degrees, middle cover **42** presses against the flat ring segments **446**P and **446**S to urge rings **446** to stand upright.

FIGS. **32**A-**32**F

FIG. **32**A is the bottom view of another preferred embodiment of a ring component **546** of the present invention and FIGS. **32**B-**32**F are bottom views of binder **1**, shown in FIGS. **1**A-**1**L, with its skeleton **50** incorporating rings **546** in placed of rings **46**. FIGS. **32**B-**32**F show rings **546** in different positions as varying numbers of forward loose-leaves **72**A are flipped beneath back cover **40**. Ring **546** comprises ring segments **546**A-**546**B and the portion of spine **53** intersected by ring segments **546**A-**546**B.

Ring segment **546**A has ring segments **546**P-**546**R and ring segment **546**B has ring segments **546**S-**546**U. Mostly elliptical ring segments **546**P and **546**S are joined to straight ring segments **546**Q and **546**T, respectively. Straight ring segments **546**Q and **546**T are bridged by straight ring segments **546**R and **546**U to complete rings **546**. Straight ring segments **546**Q, **546**R, **546**, and **546**T constitute a multiple-line perimeter segment. The two angles that straight ring segments **546**Q and **546**T make with the major axis of the partial ellipse of ring **546** are not arbitrary. Straight ring segments **546**Q and **546**T are made intentionally parallel to lines X**1** and Y**1**, respectively. Line X**1** is a tangent line to spine **53** and ring segment **546**S and line Y**1** is a tangent line to spine **53** and ring segment **546**P. When rings **546** are in their upright position, line X**1** is in the plane of the exterior surface **40**X of back cover **40** and ring segment **546**Q is parallel as shown in FIG. **32**B. Distance A**2** measured from the interior surface **40**N of back cover **40** to the under surface of rings segment **546**Q is the upright-ring loose-leaf capacity of rings **546**. Similar to rings **346**, rings **546** are wider than tall such that the upright-ring loose-leaf capacity of rings **546** is less than or equal to the loose-leaf capacity of rings **546** for the range of spine rotation illustrated in FIGS. **32**B-**32**F. Rings **546** rotate through a smaller angular range in FIGS. **32**B-**32**F than rings **346** rotate in FIGS. **30**B-**30**F. Cover **100** of FIGS. **32**B-**32**F is preferably loaded and unloaded with loose-leaves when cover **100** is open 180 degrees and rings **546** are substantially upright.

FIGS. **33**A-**33**F

FIG. **33**A is the bottom view of another preferred embodiment of a ring component **646** of the present invention and FIGS. **33**B-**33**F are bottom views of binder **1**, shown in FIGS. **1**A-**1**L, with its skeleton **50** incorporating rings **646** in placed of rings **46**. FIGS. **33**B-**33**F show rings **646** in different positions as varying numbers of forward loose-leaves **72**A are flipped beneath back cover **40**. Rings **646** are very similar to rings **546** but have less straight ring segments and are partially circular.

Ring **646** comprises ring segments **646**A-**646**B and the portion of spine **53** intersected by ring segments **646**A-**646**B. Ring segment **646**A has ring segments **646**P-**646**Q and ring segment **646**B has ring segments **646**R-**646**S. Mostly circular ring segments **646**P and **646**R are joined to straight ring segments **646**Q and **646**S, respectively. Straight ring segments **646**Q and **646**S are parallel with lines X**2** and Y**2**, respectively, and constitute a multiple-line perimeter segment.

Line X**2** is a tangent line to spine **53** and ring segment **646**R and line Y**2** is a tangent line to spine **53** and ring segment **646**P. When rings **646** are in their upright position, line X**2** is in the plane of the exterior surface **40**X of back cover **40** and ring segment **646**Q is parallel as shown in FIG. **33**B. Distance A**3** measured from the interior surface **40**N of back cover **40** to the under surface of rings segment **646**Q is the upright-ring loose-leaf capacity of rings **646**. Similar to rings **346**, rings **646** are wider than tall such that the upright-ring loose-leaf capacity of rings **646** is less than or equal to the loose-leaf capacity of rings **646** for the range of spine rotation illustrated in FIGS. **33**B-**33**F. Rings **646** rotate through a smaller angular range in FIGS. **33**B-**33**F than rings **346** rotate in FIGS. **30**B-**30**F. Cover **100** of FIGS. **33**B-**33**F is preferably loaded and unloaded with loose-leaves when cover **100** is open 180 degrees and rings **646** are substantially upright.

FIG. **34**

FIG. **34** is the bottom view of another preferred embodiment of a ring component **746** of the present invention. Ring **746** is very similar to ring **346** except that spine **553** is incorporated in place of spine **53**. Ring **746** comprises ring segments **746**A-**746**B and the portion of spine **553** intersected by ring segments **746**A-**746**B. Ring segments **746**A and **746**B closely correspond in shape and function to ring segments **346**A and **346**B of FIGS. **30**A-**30**F. Rings **746** are incorporated in binders **23**-**25** shown in FIGS. **23**A-**25**B where the skeleton is fixed to the cover with a fastener or rivet.

FIG. **35**

FIG. **35** is the bottom view of another preferred embodiment of a ring component **846** of the present invention. Ring **846** is very similar to ring **546** except that spine **553** is incorporated in place of spine **53**. Ring **846** comprises ring segments **846**A-**846**B and the portion of spine **553** intersected by ring segments **846**A-**846**B. Ring segments **846**A and **846**B closely correspond in shape and function to ring segments **546**A and **546**B of FIGS. **32**A-**32**F. Rings **846** can be incorporated in binder **25** shown in FIGS. **25**A-**25**B where the skeleton is fixed to back cover **1740**D with a rivet.

The invention provides for a minimal footprint during use without sacrificing other popular advantages common to loose-leaf binders. The binder provides the minimal footprint capability with minimal tearing stress on the loose-leaves, a flat writing surface and the ability to simultaneously open or close all rings of the binder via an actuator.

While my above descriptions contain many specificities, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of several preferred embodiments thereof. Many other variations are possible. For example, all twenty-five binder embodiments with a SOCRA skeleton can instead use a skeleton having independently-openable rings. The cover embodiments with conduits that contain spine **53** can be joined with rings that are not connected by a spine; for example, skeleton **450** could be cut into three segments via cuts between its rings and then each segment placed end-to-end in conduit **56** as when they are unified. Other spineless embodiments are easily created from binders **13**, **14** and **20** by eliminating skeleton **50** and inserting unconnected, independently-openable rings in place of rings **46** of these binders. Skeletons with more rings can be substituted by adding a corresponding number of slots to the binder cover. Skeletons with a

synchronized switching element different from those disclosed herein may be substituted. Furthermore, a synchronized switching element that opens or closes all the rings simultaneously can be replaced by a sequential switching element that opens or closes all the rings sequentially. Margin supports can be eliminated especially when writing-support pads are included. Binder **1** can be modified by eliminating its middle cover segment and attaching a wider unsegmented flexible front cover directly to back cover **40** at the location of seam **66**. The skeleton of FIGS. **26**A-**26**C can be modified so that its rings can pitch back and forth like the skeleton of FIG. **29**A to enable reduced binder thickness when the binder is not filled to capacity. The binder of FIG. **8** could have a second loops flap attached to its middle cover to provide an alternative attachment to the back cover. Other variants comprise a skeleton with rings that can rotate relative to its spine's longitudinal dimension while a portion of its spine is held still. One such variant comprises a spine with a rectangular cross-section with a height equal to the thickness of its back cover and where the spine rigidly attaches along one edge of the back cover flush with the interior and exterior surfaces of the back cover to extend the back cover writing surface; the spine connects binder rings which can rotate about the spine's longitudinal dimension through slots in the spine. A second such variant can be made simply by placing spine **53** of skeleton **50** in a sleeve with slots corresponding to rings **46** that allow spine **53** to rotate relative to the sleeve; the sleeve which is part of this variant's spine can be rigidly riveted to a cover but still allow spine **53** contained therein and rings **46** to rotate relative to the cover. This use of a fixed sleeve may include the previous variant above where the sleeve is designed with a rectangular cross-section, and having spine **53** of skeleton **50** disposed within and rotatable relative to the rectangular sleeve while the sleeve is held still. Another variant, which lacks a distinct skeleton component, has a cover which is integrally formed with a synchronized switching element for simultaneously opening and closing its rings and which folds flat when open 360 degrees, and has rings that can rotate around a near-ring edge of the flatly-folded cover when the cover is open 360 degrees.

FIGS. **36**A-**36**F

FIGS. **36**A-**36**F show perspective and bottom views with a detailed sectional portion of a further preferred embodiment of a skeleton **650** and its components of the binder of the present invention. Ring segments **46**A are attached to rod **652**A via weld, braze, casting or other appropriate means. Similarly, ring segments **46**B are attached to rod **652**B. When rod **652**A is assembled alongside rod **652**B within wrap housing **41** to form spine **653**, the spaced ring segments **46**A and **46**B protrude through similarly spaced slots **155**A and **155**B, respectively, of wrap housing **41**. Slots **155**A and **155**B are integrally formed with housing-slot arch **112**. Slots **155**A and **155**B closely bound ring segments **46**A and **46**B to prevent longitudinal motion of rod **652**A relative to rod **652**B. Rods **652**A and **652**B rotate adjacent to each other in opposite directions through a limited angle to open and close ring segments **46**A relative to ring segments **46**B of rings **46**. Since rods **652**A and **652**B cannot move longitudinally relative to each other, ring segments **46**A and **46**B of ring **46** open and close transversely relative to spine **653**. Rods **652**A and **652**B have cross-sections that are preferably circular or slightly elliptical, having widths and heights that are of similar size so that the width and height of the resultant spine are similar in magnitude, preferably neither dimension being more than double the size of the other, thus keeping the resultant spine suitable for pivotal insertion in a conduit of a cover segment (FIGS. **45**B-**45**C). Or more broadly stated, each rod **652**A and **652**B has a cross-section with a major dimension and minor dimension that are roughly perpendicular and that are similar in magnitude so that the major dimension and minor dimension of the cross-section of the resultant spine are similar in magnitude.

Roughly L-shaped torque levers **45**A and **45**B are integrally formed with or are attached to the ends of rods **652**A and **652**B, respectively, by weld, braze, casting, or other appropriate means. Torque levers **45**A and **45**B, which are spanned by tensile spring **83** of spreader **59**, have elongated stems that extend transversely from spine **653** and its component rods **652**A and **652**B. Consequently, torque levers **45**A and **45**B are highly effective in transforming the tensile force exerted by spring **83** into strong opposing torsional forces, which act on rods **652**A and **652**B when rings **46** are opened and closed or are in the process of being either opened or closed. For example, when skeleton **650** is closed, springs **83** pull torque levers **45**A and **45**B towards each other, which is transmitted as opposing static torque to rods **652**A and **652**B, which in turn, is transmitted as opposing static forces on the free ends of rings **46**A and **46**B to keep rings **46** closed. Torque levers **45**A and **45**B provide for robust closure of rings **46**.

FIG. **36**E shows a bottom view of skeleton **650** with a detailed sectional portion showing components of the synchronized switching element or actuator **451** of skeleton **650**. Actuator **451** comprises rods **652**A and **652**B, torque levers **45**A and **45**B, and spreader **59**. In this embodiment of a skeleton **650**, rods **652**A and **652**B serve as the first and second connective elements, respectively, of actuator **451**. Spring-loaded spreader **59** includes spring **83** housed within telescopic capsule **85** and thus is able to extend and retract. Retraction of spreader **59** is limited by stop **232**. FIG. **36**F shows Telescopic capsule **85** has pinholes **63**A and **63**B which receive the free ends of L-shaped torque levers **45**A and **45**B, respectively. One end of spreader **59** pivots about the free end of torque lever **45**A and the other end of spreader **59** pivots about the free end of torque lever **45**B.

Spring **83** of actuator **451** is tensilely loaded when skeleton **650** is either open or closed and spring **83** resists the opening of ring segments **46**A relative to ring segments **46**B when spring **83** is on the ring side of spine **653** (FIG. **36**E). However, spring **83** resists the closure of ring segments **46**A and **46**B when spring **83** is on the opposite side of spine **653** away from the free ends of ring segments **46**A and **46**B (FIG. **36**F).

To open skeleton **650**, middle rings **46**A and **46**B of skeleton **650** are pulled apart, which twists rods **652**A and **652**B, which in turn spreads torque levers **45**A and **45**B apart against the resistance of springs **83** until springs **83** travel from one side of spine **653** to the other side at which point springs **83** switch from exerting closure force on skeleton **650** to exerting opening force. When driven only by this opening force, Skeleton **650** continues opening until telescopic capsule **85** of spreader **59** retracts to its limit as set by stop **232**.

To close skeleton **650**, rings **46**A and **46**B are pushed toward each other against resistance of springs **83** until springs **83** travel from one side of spine **653** to the ring side of spine **653** at which point springs **83** switch from exerting opening force on skeleton **650** to exerting closure force. When driven only by this closure force, Skeleton **650**

continues closing until the free ends of rings **46**A and **46**B abut each other. Rings **46** then remain closed because of the tensile loading of springs **83**.

FIGS. **37**A-**37**D

FIGS. **37**A-**37**D show perspective and bottom views of a further preferred embodiment of a skeleton **750** and its components of the binder of the present invention with detailed sectional portions of the actuator **551** thereof. Skeleton **750** comprises the same spine **653** and rings **46** as skeleton **650** shown in FIGS. **36**A-**36**F, but incorporates different torque levers **145**A-**145**B and spreader **159**. Actuator **551** comprises rods **652**A and **652**B of spine **653**, torque levers **145**A and **145**B, and spreader **159**. In particular, FIG. **37**A shows an exploded view of another preferred embodiment of a spring-loaded spreader **159**. Spreader **159** comprises telescopic capsule **185**, static pins **102**A-**102**B, slide pin **102**C, and tensile spring **83**. Capsule segment **185**A fits snugly into and can slide longitudinally within capsule segment **185**B. Capsule segment **185**A has guide slot **101**A and pinhole **163**A, which receives static pin **102**A. Capsule segment **185**B has guide slot **101**B and pinhole **163**B, which receives static pin **102**B. When spreader **159** is assembled and is part of skeleton **750**, slide pin **102**C is inserted within both guide slots **101**A and **101**B and is hooked by one end of spring **83**; static pin **102**B is hooked by the other end of spring **83** and is inserted within pinhole **163**B of capsule segment **185**B as well as within hole **163**D of torque lever **145**B; and static pin **102**A is inserted within pinhole **163**A of capsule segment **185**A as well as within hole **163**C of torque lever **145**A.

To open skeleton **750**, middle rings **46**A and **46**B of skeleton **750** are pulled apart, which spreads torque levers **145**A and **145**B apart against the resistance of springs **83**. As torque levers **145**A and **145**B spread wider, capsule segment **185**A telescopically extends from capsule segment **185**B and the border of guide slot **101**A pushes slide pin **102**C along guide slot **101**B in the direction of static pin **102**A until it reaches the tip of pointed tooth **128** of guide slot **101**B. Upon clearing this tip, guide slot **101**A pushes slide pin **102**C in a new direction roughly toward spine **653**. After clearing this tip, slide pin **102**C will maintain spreader **159** in its extended position upon release of rings **46**A and **46**B, thus keeping rings **46** open (FIG. **37**D).

To close skeleton **750**, middle rings **46**A and **46**B of skeleton **750** are pushed toward each other, which brings torque levers **145**A and **145**B towards each other against the partial resistance of springs **83**. As torque levers **145**A and **145**B approach each other, capsule segment **185**A telescopically retracts within capsule segment **185**B and the border of guide slot **101**A pushes slide pin **102**C along guide slot **101**B in the direction away from spine **653** toward the tip of pointed tooth **128**. After clearing this tip, spring **83** drags slide pin **102**C along guide slot **101**B in the direction of static pin **102**B to retract spreader **159** until ring segments **46**A abut ring segments **46**B, thus closing rings **46** (FIG. **37**C). Springs **83** are still under tension when rings **46** are closed which provides for spring-loaded closure of skeleton **750**.

FIGS. **38**A-**38**C

FIGS. **38**A-**38**C show perspective and bottom views of a further preferred embodiment of a skeleton **850** of the binder of the present invention with detailed sectional portions of the actuator **651** thereof. Skeleton **850** comprises the same spine **653** and rings **46** as skeleton **650** shown in FIGS. **36**A-**36**F, but incorporates different torque levers **145**A-**145**B and spreader **259**. Actuator **651** comprises rods **652**A and **652**B of spine **653**, torque levers **145**A and **145**B, and spreader **259**. FIG. **38**B shows a sectional view of another preferred embodiment of a spring-loaded spreader **259**. Spreader **259** comprises telescopic capsule **285**, pins **102**A-**102**B, spin cylinder **103**A, slide cylinder **103**B, and tensile spring **83**. Capsule **285** includes capsule cylinder **285**A, which fits snugly into and can slide longitudinally within capsule segment **285**B. Slide cylinder **103**B fits in spin cylinder **103**A, which in turn fits in capsule cylinder **285**A. Capsule cylinder **285**A has pinhole **263**A, which receives pin **102**A and capsule segment **285**B has pinhole **263**B, which receives pin **102**B. When spreader **259** is assembled into skeleton **850**, pin **102**A is inserted within pinhole **263**A of capsule cylinder **285**A as well as within hole **163**C of torque lever **145**A (FIGS. **37**B and **38**A-**38**B) and is hooked by one end of spring **83**; pin **102**B is hooked by the other end of spring **83** and is inserted within pinhole **263**B of capsule segment **285**B as well as within hole **163**D of torque lever **145**B.

Spin cylinder **103**A, slide cylinder **103**B, and Capsule cylinder **285**A are part of a two-state mechanical switch well known to ballpoint pens for extending and retracting the ballpoint. In ballpoint pens, this two-state mechanical switch depends upon the constant resistance of a compression spring; in skeleton **850**, the constant resistance is supplied by tensile spring **83** via linkages (pins **102**A-**102**B). Additionally, the characteristic push button cylinder of the ballpoint mechanism is adapted here to become slide cylinder **103**B, which is pulled by pin **102**B. This adaptation includes removing the portion of the push button cylinder that would protrude from the top of the ballpoint pen and adding the cylindrical portion of slide cylinder **103**B that penetrates spin cylinder **103**A and loops pin **102**B (FIG. **38**B). Instead of pressing a push button once to extend a ballpoint and a second time to retract it, ring segments **46**A and **46**B are pulled apart and released once to extend spreader **259**, which maintains rings **46** open, and are pulled apart and released a second time to retract spreader **259**, allowing rings **46** to close. The straight grooves and spiral ledges of spin cylinder **103**A, slide cylinder **103**B, and capsule cylinder **285**A, which characterize this two-state switch, are well known and are not illustrated in FIGS. **38**A-**38**C.

To open skeleton **850**, middle rings **46**A and **46**B of skeleton **850** are pulled apart, which spreads torque levers **145**A and **145**B apart against the resistance of springs **83**. Spreading torque levers **145**A and **145**B separates pins **102**A and **102**B so that pin **102**B pulls slide cylinder **103**B away from capsule cylinder **285**A; concurrently, slide cylinder **103**B also pushes spin cylinder **103**A in the same direction and capsule cylinder **285**A telescopically extends from capsule segment **285**B. If the rings are pulled far enough apart and released, spin cylinder **103**A moves to its extended position to lock spreader **259** in its extended state under the force of spring **83**. When spreader **259** is locked in its extended state between torque levers **145**A and **145**B, rings **46** are kept open (FIG. **38**C).

To close skeleton **850**, middle rings **46**A and **46**B of skeleton **850** are pulled apart again and released. If pulled apart far enough and released under the force of spring **83**, spin cylinder **103**A moves to its retracted position enabling spreader **259** to retract as well such that capsule cylinder **285**A telescopically retracts within capsule segment **285**B. Torque levers **145**A and **145**B approach each other, until ring segments **46**A abut ring segments **46**B, thus closing rings **46** (FIG. **38**B). Springs **83** are still under tension when rings **46** are closed which provides for spring-loaded closure of skeleton **850**.

Spreader **259** can be assembled in an alternative way by attaching spring **83** to spin cylinder **103**A, instead of pin **102**B, by an appropriate attachment means that does not inhibit the spin action associated with spin cylinder **103**A during operation. When this alternative assembly is used, ring segments **46**A-**46**B can flop back and forth a limited distance when rings **46** are open and are not biased to a fixed position.

FIGS. **39**A-**39**C

FIGS. **39**A-**39**C show a front view of another preferred embodiment of a spreader **359** and bottom views of a further preferred embodiment of a skeleton **950** of the binder of the present invention. Skeleton **950** comprises the same spine **653** and rings **46** as skeleton **650** shown in FIGS. **36**A-**36**F, but incorporates different torque levers **245**A-**245**B and spreader **359**. Skeleton **950** has actuator **751**, which comprises rods **652**A and **652**B of spine **653**, zigzag torque levers **245**A and **245**B, and spreader **359**. Spreader **359** is a bar having pinholes **363**A and **363**B, which receive torque levers **245**A and **245**B, respectively. Zigzag torque levers **245**A and **245**B have open and closed indentation positions for spreader **359**.

To open skeleton **950**, spreader **359** is slid along both torque levers from the closed indentation position (FIG. **39**B) to the open indentation position (FIG. **39**C). Spreader **359** is able to slide from the closed indentation position because of the elasticity of torque levers **245**A-**245**B and the twist elasticity of spine rods **652**A-**652**B of spine **653**.

To close skeleton **950**, spreader **359** is slid along both torque levers from the open indentation position to the closed indentation position. Closure of skeleton **950** can seem slightly spring-loaded if preferred by utilizing the elasticity of torque levers **245**A-**245**B and twist elasticity of rods **652**A-**652**B of spine **653**; to add the appearance of slight spring-loaded closure, pinholes **363**A-**363**B of spreader **359** are simply located a little closer to each other than their positions on a spreader **359** that just brings ring segments **46**A and **46**B of skeleton **950** into contact without stress.

FIGS. **40**A-**40**B

FIGS. **40**A-**40**B show perspective views of portions of a further preferred embodiment of a skeleton **1050** of the binder of the present invention. Skeleton **1050** comprises the same spine **653** as skeleton **650** shown in FIGS. **36**A-**36**F, but incorporates a different middle ring **946** and has no torque levers and no spreaders. Skeleton **1050** has actuator **851**, which comprises rods **652**A and **652**B of spine **653** and interlocking ring **946** with ring sleeve **106**. Skeleton **1050** also has rings **46** near opposite ends of spine **653**, but are not shown in FIGS. **40**A-**40**B. Ring sleeve **106** is springy and has inner protruding rim **106**A. Ring **946** has ring notches **107**A and **107**B near ring interlock **108**. When ring **946** is locked securely closed, ring sleeve **106** covers ring interlock **108** and is held in place by rim **106**A which is spring-biased to ring-closure notch **107**A. Sleeve **106** reinforces interlock **108**, which otherwise is prone to open accidentally during use.

To open skeleton **1050**, ring sleeve **106** is pulled away from notch **107**A and is slid along ring **946** away from interlock **108** until rim **106**A finds ring-open notch **107**B; then ring segments **946**A and **946**B are unhitched and pulled apart (FIG. **40**B). To close skeleton **1050**, ring segments **946**A and **946**B are hitched together creating interlock **108**; then ring sleeve **106** is pulled away from ring-open notch **107**B and is slid along ring **946** toward interlock **108** until rim **106**A finds ring-closure notch **107**A.

Closure of rings **46** of skeleton **1050** can seem slightly spring-loaded if preferred by utilizing the elasticity of ring segments **946**A-**946**B, ring segments **46**A-**46**B, and twist elasticity of rods **652**A-**652**B of spine **653**. To add the appearance of slight spring-loaded closure, ring segments **946**A-**946**B and ring segments **46**A-**46**B should be attached to rods **652**A-**652**B, respectively, such that ring segments **946**A and **946**B are slightly open when ring segments **46**A and **46**B abut each other; when ring segments **946**A and **946**B are then forced together and locked close, rings **946**, rings **46**, and rods **652**A-**652**B will all be under elastic loading.

FIGS. **41**A-**41**F

FIGS. **41**A-**41**F show perspective and bottom views and a detailed sectional portion of a further preferred embodiment of a skeleton **1150** and its components of the binder of the present invention. Skeleton **1150** has rings **46**, spine **753**, and actuator **851**. Rings segments **46**A and **46**B are attached to rods **752**A and **752**B, respectively, via weld, braze, casting, or other appropriate means. Cleats **109**A and **109**B are attached to the backs of rods **752**A and **752**B, respectively. Spine **753** is formed by assembling rod **752**A alongside rod **752**B within wrap bands **141** and with cleats **109**A interspaced with cleats **109**B. Both the snug placement of bands **141** between pairs of rings **46** as well as the snug interspacing of cleats **109**A with **109**B prevent the longitudinal motion of rod **752**A relative to rod **752**B. Cleats **109**A and **109**B are attached to rods **752**A and **752**B along edges **752**C and **752**D, respectively, to facilitate pivot motion between rods **752**A and **752**B. When spine **753** is assembled, rods **752**A and **752**B pivot in opposite directions about contacting edges **752**C and **752**D through a limited angle to open or close ring segments **46**A relative to ring segments **46**B. The transverse cross-section of rods **752**A and **752**B (excluding cleats **109**A-**109**B) are shaped like a slice of pie having an obtuse angle (FIG. **41**E). The pie-slice cross-sections of rods **752**A and **752**B and the short-length of cleats **109**A-**109**B enable this pivot motion to occur within a cylindrical space, the obtuse-angle point of each pie-slice cross-section corresponding to edges **752**C and **752**D, respectively.

Torque levers **345**A and **345**B are integrally formed with or are attached to the ends of rods **752**A and **752**B preferably by casting, but may be attached by weld, braze, or other appropriate means. To facilitate the preferred casting of the whole component of skeleton **1150** shown in FIG. **41**B as well as the whole component of skeleton **1150** shown in FIG. **41**C using only one mold, torque lever **345**A is attached to the bottom of rod **752**A and the top of rod **752**B, and torque lever **345**B is attached to the bottom of rod **752**B and the top of rod **752**A. Torque levers **345**A and **345**B have protruding knobs **345**C and **345**D, respectively, which are connected by tensile spring **83**. Push levers **87**A and **87**B are integrally formed with torque levers **345**A and **345**B, respectively. Spring-metal ratchet pawl **105** is attached to push lever **87**A and engages push lever **87**B when push levers **87**A and **87**B are pivoted through a particular angle. Extendable capsule **385** hides spring **83** and has capsule segments **385**A-**385**B. Capsule segments **385**A and **385**B are integrally formed with torque levers **345**A and **345**B, respectively.

FIGS. **41**E-F shows bottom views of skeleton **1150**. Actuator **851** comprises rods **752**A and **752**B, torque levers **345**A and **345**B, spreader **459**, and push levers **87**A and **87**B. In this embodiment of a skeleton **1150**, rods **752**A and **752**B serve as the first and second connective elements, respec-

tively, of actuator **851**. Spring-loaded spreader **459** comprises spring **83**, ratchet pawl **105**, and push levers **87**A-**87**B and locks rings open when pawl **105** of push lever **87**A engages push lever **87**B. Tensile spring **83** is always under tension upon assembly of skeleton **1150**.

To open skeleton **1150**, push levers **87**A and **87**B are pushed together against the resistance of spring **83** until ratchet pawls **105** engage push levers **87**B, meanwhile rods **752**A and **752**B pivot in opposite directions to open rings **46**. Upon engagement, ratchet pawls **105** resists the closure of skeleton **1150** by spring **83** (FIG. **41**F).

To close skeleton **1150**, the free ends of ratchet pawls **105** are lifted away from push levers **87**B to disengage them, allowing spring **83** to act on torque levers **345**A and **345**B to pivot rods **752**A and **752**B until ring segments **46**A abut ring segments **46**B (FIG. **41**E). Rings **46** then remain closed because of the tensile loading of springs **83**.

FIG. **42**

FIG. **42** shows a sectional view of a further preferred embodiment of a spine **853** of the binder of the present invention with rings **46** attached. Spine **853** has interlocking rods **852**A and **852**B, which do not require a wrapping band or housing to be assembled, but are joined together in puzzle-link fashion. Rod **852**A has a cross-section of a partial hollow cylinder, having a longitudinal opening **104** extending the length of rod **852**A and which receives a partly cylindrical portion of rod **852**B. Rod **852**B has a cross-section with a partly circular portion that when extended longitudinally is the partly cylindrical portion of rod **852**B, which is inserted into rod **852**A. A portion of rod **852**B protrudes into longitudinal opening **104** enabling rod **852**B to be stronger than if it were only a cylindrical rod because of its relatively larger cross-sectional area, which is roughly shaped like a short old-fashioned keyhole. The width or span of the longitudinal opening **104** of rod **852**A is smaller than the diameter of the partly cylindrical portion of rod **852**B; therefore, rod **852**B is inserted into rod **852**A either by snapping it in transversely, or by sliding it in longitudinally from one end. Rods **852**A and **852**B are constrained from moving longitudinally relative to one another by some means but can pivot through a limited angle relative to each other to enable the opening and closing of ring segments **46**A relative to ring segments **46**B. Since rods **852**A and **852**B cannot move longitudinally relative to each other, ring segments **46**A and **46**B of ring **46** open and close transversely relative to spine **853**.

FIGS. **43**A-**43**B

FIGS. **43**A-**43**B show bottom views with a detailed sectional portion of a further preferred embodiment of a skeleton **1250** of the binder of the present invention. Ring segments **46**A and **46**B and cleats **109**A and **109**B are attached to rods **952**A and **952**B, respectively. Rods **952**A and **952**B have longitudinal clefts **110**A and **110**B, which receive opposite edges of sheet-metal arc-spring housing **43**. Spine **953** is formed by assembling rod **952**A alongside rod **952**B within arc-spring housing **43** and with cleats **109**A interspaced with cleats **109**B. Rod **952**A and **952**B can pivot about contacting edges **952**C and **952**D upon assembly of spine **953**. Arc-spring housing **43** exerts a compressive force on clefts **110**A and **110**B. When edges **952**C and **952**D are within the perimeter of arc-spring housing **43**, this compressive force acts to keep rings **46** closed (FIG. **43**A) and when edges **952**C and **952**D are outside the perimeter of arc-spring housing **43**, this compressive force acts to keep rings **46** open (FIG. **43**B). Rods **952**A and **952**B have roughly pie-slice-shaped cross-sections (excluding cleats **109**A-**109**B), which enables spine **953** to have a substantially cylindrical cross-section when rings **46** are closed (FIG. **43**A). Skeleton **1250** has actuator **951**, which comprises rods **952**A-**952**B and spring **43**.

To open skeleton **1250**, ring segments **46**A and **46**B are pulled apart against the compressive force of arc-spring housing **43** until edges **952**C and **952**D pivot beyond the perimeter of the arc-spring housing **43** at which point the compressive force begins to open the rings. Rings **46** continue opening until cleats **109**A and **109**B abut rods **952**B and **952**A respectively. To close skeleton **1250**, ring segments **46**A and **46**B are pushed together until they abut each other and then kept closed by the compressive force of arc-spring housing **43**. Optional torque levers with spring-loaded spreaders can be added to skeleton **1250** to increase the robustness of the closure force.

FIG. **44**

FIG. **44** shows a bottom view of a further preferred embodiment of a ring **1046** of the binder of the present invention. Ring **1046** comprises ring segments **1046**A-**1046**B and the portion of spine **53** intersected by ring segments **1046**A-**1046**B. Ring segments **1046**A and **1046**B have varying prong thickness. Ring **1046** defines upright-ring diameter **111** which is the diameter that passes through the center of ring **1046** and the center of spine **53**. The portions of ring segments **1046**A-**1046**B that are roughly parallel to diameter **111** are thinner than the portions of rings segments **1046**A-**1046**B that are roughly perpendicular to diameter **111**. Consequently, the inner diameter of ring **1046** that is parallel to diameter **111** is less than the inner diameter that is perpendicular to diameter **111**. This variable prong thickness enables a more stable loose-leaf ring capacity during usage when the binder may be closed, opened 180 degrees, or opened 360 degrees. This variable prong thickness stabilizes capacity by compensating for the reduction in capacity otherwise caused by the existence of the spine **53** within the ring perimeter when the binder is open 360 degrees.

FIGS. **45**A-**45**C

FIG. **45**A shows a perspective view of a further preferred embodiment of a skeleton **1350** of the binder of the present invention. FIGS. **45**B-**45**C are bottom views of Binder **1** of FIGS. **1**A-**1**L, with skeleton **1350** substituted in place of skeleton **50**. Skeleton **1350** uses the same rods **652**A-**652**B of spine **653** described with FIGS. **36**A-**36**F and the spreader **259** described with FIGS. **38**A-**38**C. Skeleton **1350** has rings **1146**, spine **1053**, and actuator **1051**. Ring segments **1146**A and **1146**B are attached to rods **652**A and **652**B, respectively, via weld, braze, casting, or other appropriate means. Likewise, intra-ring torque levers **445**A and **445**B are integrally formed with or are attached to the spine-end of ring segments **1146**A and **1146**B, respectively. Intra-ring torque levers **445**A-**445**B exist within both the plane and perimeter of the ring segments **1146**A-**1146**B to which they are attached. Although torque levers **445**A-**445**B are integrally formed with the ends of ring segments **1146**A-**1146**B, respectively, at the intersection with spine **1053**, torque levers **445**A-**445**B are distinguishable from ring segments **1146**A-**1146**B in that loose-leaves **72** are prevented from hanging off of torque levers **445**A-**445**B by spine **1053**. Rings **1146** comprise rings segments **1146**A and **1146**B and the portion of spine **1053** that is intersected, and excludes torque levers **445**A and **445**B. Spine **1053** is formed by assembling rod **652**A alongside rod **652**B within wrap bands **241**, which are snugly fitted between pairs of rings **1146**. Rods **652**A and **652**B rotate adjacent to each other in

opposite directions through a limited angle to open and close ring segments **1146**A relative to ring segments **1146**B of rings **1146**. The snug placement of bands **241** between pairs of rings **1146** prevent the longitudinal motion of rod **652**A relative to rod **652**B. Actuator **1051** comprises rods **652**A-**652**B, torque levers **445**A-**445**B, and spreader **259**. Spreader **259** connects middle torque levers **445**A and **445**B and springs **83** connect the torque levers **445**A and **445**B that are located near opposite ends of spine **1053**. Spreader **259** is attached to skeleton **1350** via pins **102**A-**102**B, which are inserted within holes **463**A-**463**B, respectively, of torque lever **445**A (FIG. **45**B). Rings segments **1146**A and **1146**B have margin ring segments **1146**C and **1146**D, respectively. The purpose of margin ring segments **1146**C and **1146**D is to accommodate the margin of ring-bound loose-leaves **72** between the loose-leaf holes and adjacent loose-leaf edge during usage (FIGS. **45**B-**45**C). FIGS. **45**B-**45**C show skeleton **1350** inserted within back cover **40** of cover **100** with front cover **44** flipped 360 degrees from its closed cover position.

Skeleton **1350** is operated in the same manner as skeleton **850** of FIGS. **38**A-**38**C, which also has spreader **259**.

Skeleton embodiments **650**, **750**, **850**, **950**, **1050**, **1150**, **1250** and **1350** can be used in place of skeleton embodiment **50** in each and every of the preferred embodiments that incorporate skeleton **50** of the present invention via a small modification to the covers to accommodate torque lever pairs **45**A-**45**B, **145**A-**145**B, **245**A-**245**B, **345**A-**345**B, **445**A-**445**B, spreaders **59**, **159**, **259**, **359**, **459** and/or push levers **87**A and **87**B, which are more broadly categorized as actuator levers. Only a small modification is needed because the torque lever, spreader, and actuator lever embodiments of the present invention remain in the longitudinally projected perimeter of their associated ring embodiments as seen in FIGS. **36**E, **37**C, **38**B, **39**B, **41**E, and **45**B. Therefore, the various means employed by the cover embodiments of the present invention to accommodate rotation of the rings about an edge of the flatly folded covers can be used to accommodate rotation of the torque levers, spreaders, and actuator levers. For example, this modification can be simply a transverse slot or equivalent means that is incorporated into the covers of the respective embodiments of the binders of the present invention such as slots **58**A-**58**C of FIG. **1**A or holes **74**C-**74**D of FIG. **20**A. Furthermore, transverse opening of rings and transverse spreading of torque levers during use enable cover slots such as cover slots **58**A-**58**C of FIG. **1**A to be narrow.

Intra-ring torque levers **445**A-**445**B of skeleton **1350** exist within both the plane and perimeter of the ring segments **1146**A-**1146**B to which they are attached. Consequently, skeleton **1350** can be used in all of the cover embodiments of the binder of the present invention that use slots to avoid cover interference with ring rotation when these cover embodiments are open 360 degrees (FIGS. **1**A-**1**F, FIGS. **19**A-**19**C), but not with some cover embodiments (unless modified) that use cover holes (FIGS. **20**A-**20**C).

While my above descriptions contain many specificities, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of several preferred embodiments thereof. Many other variations are possible. For example, although spring-loaded spreaders have been shown with tensile springs, spreaders and torque levers can be adapted and possibly other parts added to use other springs such as compression, torsion, spiral, and sheet-metal springs. Rubber bands may also be substituted for tensile springs. Another possible embodiment of a spreader comprises a toggle switch and tensile spring. Spreaders and actuator levers with longitudinally oriented components that connect the transversely oriented intra-ring torque levers of skeleton **1350** can be incorporated, but these longitudinally oriented components must be positioned high enough within the rings away from the spine so as to clear the near-ring edge of the flat formation of various cover embodiments when the rings are rotated about the near-ring edge. Another possible embodiment of a pair of torque levers is a pair of interlocking torque levers; the interlocking means of such torque levers may or may not be spring-loaded.

FIGS. **46**A-**46**B

FIGS. **46**A-**46**B show perspective views of a further preferred embodiment of a cover **2600** and its components of the binder of the present invention. Cover **2600**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**L, offers a simplified means of binder assembly relative to cover **100**. Cover **2600** comprises front cover **44**, middle cover **42**, and back cover **1840**. Back cover **1840** has back cover portion **1840**A and separable conduit casing **114**. Back cover portion **1840**A is a complementary back cover portion to conduit casing **114** since conduit casing is a component of back cover **1840**. Likewise, front cover **44**, middle cover **42**, and back cover portion **1840**A together make up a complementary cover portion to conduit casing **114** since conduit casing **114** is also a component of the whole cover **2600**. Back cover **1840** joins middle cover **42** at seam **66**. Conduit casing **114** facilitates easy assembly and can be made from various materials including metal, cardboard, and plastic. Conduit casing **114** has a U-shaped cross-section and wraps around edge **1840**B of back cover portion **1840**A to define conduit **556**. Back cover portion **1840**A has holes **113**A and conduit casing **114** has holes **113**B which are aligned during assembly to receive rivets **69**, which affix conduit casing **114** onto back cover portion **1840**A. Back cover portion **1840**A has short slots **758**A-**758**C, which are effectively extended by corresponding longer slots **758**L-**758**N of conduit casing **114** upon assembly. The thickness of conduit casing **114** is similar to that of back cover portion **1840**A such that conduit casing **114** is substantially planar with back cover portion **1840**A upon assembly. Like cover **100**, conduit **556** can receive spine **53** of skeleton **50** of FIGS. **1**G-**1**L. Moreover, cover **2600**, with little or no modification, can incorporate skeletons **50**, **150**, **250**, **350**, **450**, **650**, **750**, **850**, **950**, **1050**, **1150**, **1250**, and **1350** of FIGS. **1**G, **26**A, **27**A, **28**A, **29**A, **36**A, **37**C, **38**B, **39**B, **40**A, **41**A, **43**A, **45**A, respectively, of the binder of the present invention as well as other skeletons with independently openable rings disclosed herein. Notably, conduit **556** is open at both ends, which for example, can provide access to push button **39** of skeleton **250** or can accommodate torque levers **45**A-**45**B and spreader **59** at the ends of skeleton **650**. Additionally, back cover **1840** has end slots **758**Y-**758**Z to also accommodate torque levers **45**A-**45**B and spreader **59** at the ends of skeleton **650** so that spreaders **59** do not protrude from cover **2600** when cover **2600** is closed. Cover **2600** operates essentially the same as cover **100** of FIGS. **1**A-**1**F during usage.

FIGS. **47**A-**47**B

FIGS. **47**A-**47**B show perspective views of a further preferred embodiment of a cover **2700** and its components of the binder of the present invention. Cover **2700**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**L, offers a simplified means of binder assembly relative to cover **100**. Cover **2700** comprises front cover **44**, middle cover **2142**, and back cover **1940**. Middle cover **2142** has middle cover portions **2142**A-**2142**C. Back cover **1940** has

back cover portion **1940**A and separable conduit casing **214**. Middle cover portion **2142**C is disposed between middle cover portion **2142**B and back cover portion **1940**A and is thinner than each to form open-groove conduit **656**B. Conduit casing **214** facilitates easy assembly and can be made from various materials including metal, cardboard, and plastic. Conduit casing **214** has a roughly P-shaped cross-section with a substantially planar portion **214**A and a tubular portion **214**B. Planar portion **214**A is affixed upon interior surface of back cover portion **1940**A while part of tubular portion **214**B dips into open-groove conduit **656**B so that conduit casing **214** remains fairly planar with back cover portion **1940**A upon assembly. Tubular portion **214**B of conduit casing **214** defines conduit **656**A. Back cover portion **1940**A has holes **213**A and conduit casing **214** has holes **213**B which are aligned during assembly to receive rivets **69**, which affix conduit casing **214** onto back cover portion **1940**A. Conduit casing **214** has slots **858**L-**858**N. Edge **1940**B of back cover portion **1940**A is straight, but the mounting of conduit casing **214** upon back cover portion **1940**A furnishes back cover **1940** with slots **858**A-**858**C and end slots **858**Y-**858**Z. Middle cover portion **2142**C has fold **2142**D to enable front cover **44** and middle cover **2142** to flip open flatly up against back cover **1940**. Preferably, fold **2142**D is disposed at or adjacent to edge **1940**B of back cover portion **1940**A. Similar to cover **100** of FIGS. **1**A-**1**F, middle cover **2142** joins back cover **1940** between conduit **656**A and far parallel edge **1940**C. Cover **2700** can readily incorporate skeletons **650**, **750**, **850**, or **950** of FIGS. **36**A, **37**C, **38**B, **39**B, respectively, of the binder of the present invention in which case conduit **656**A receives spine **653** and slots **858**A-**858**C receive rings **46**. The short slots **858**A-**858**C of cover **2700** are well suited for use with skeletons **650**, **750**, **850**, and **950**, which have rings **46** attached in a relatively elevated position atop spine **653**. With little or no modification, cover **2700** can also incorporate skeletons **50**, **150**, **250**, **350**, **450**, **1050**, **1150**, **1250**, and **1350** of FIGS. **1**G, **26**A, **27**A, **28**A, **29**A, **40**A, **41**A, **43**A, **45**A, respectively, of the binder of the present invention as well as other skeletons with independently openable rings disclosed herein. Examples of such modification include using longer partially penetrative slots **258**A-**258**C of FIG. **5**A or using longer fully penetrative slots **558**A-**558**C of FIG. **18**A. When employing the second example modification, cover **2700** becomes a slight variant of cover **1800** of FIGS. **18**A-**18**B. Cover **2700** operates essentially the same as cover **100** of FIGS. **1**A-**1**F during usage.

FIGS. **48**A-**48**E

FIGS. **48**A-**48**E show perspective and bottom views of another preferred embodiment of a binder **28**X of the present invention. The binder **28**X comprises cover **2800** and skeleton **1450**. Skeleton **1450** is an inexpensive single piece of molded PVC plastic. Skeleton **1450** has spine **1153** and rings **1246**. Spine **1153** has rods **1153**A-**1153**B, which are integrally formed with hinge **1153**C. Rings **1246** have ring segments **1246**A-**1246**B, which are attached to rods **1153**A-**1153**B, respectively. Ring segments **1246**A have ring slots **148** and ring segments **1246**B have tabs **147**. Tabs **147** snugly snap into corresponding reciprocal ring slots **148** forming interlocking closure or snap interlocks **208** to securely close rings **1246**. Each ring **1246** is opened simply by forcefully pulling rings segments **1246**A and **1246**B apart to disengage interlocks **208**. Ring segments **1246**A-**1246**B are semicircular members each with a square groove along its inside curvature such that ring segments **1246**A-**1246**B have roughly U-shaped cross-sections, which impart strength to rings **1246** in a similar manner to the purposeful shape of I-beam girders. Importantly, because of the flexible PVC plastic of skeleton **1450**, rings **1246** are opened and closed individually, not concurrently, since spine rods **1153**A-**1153**B twist easily and thus transfer torque ineffectively. Cover **2800**, which is a slight variant of cover **600** of the binder **6** of FIGS. **6**A-**6**B, offers a simplified means of binder assembly relative to cover **600**. Cover **2800** comprises back cover **2040** and optional front cover **1244**. Back cover **2040** has back cover portion **2040**A and conduit casing **314**. Conduit casing **314** is a thin sheet preferably made of inexpensive flexible material such as plastic, vinyl, cardboard, canvas or paper as opposed to metal to curtail production costs. Conduit casing **314** extends from the exterior surface **2040**X of back cover portion **2040**A near edge **2040**B. Conduit casing **314** has adhesive closure strip **116**A and optional stick-resistant peel-off ribbon **116**B to prevent inadvertent adhesion of conduit casing **314** to unintended surfaces until skeleton **1450** is ready to be assembled with cover **2800**. Flexible flap conduit casing **314** and adhesive closure strip **116**A make up an instant user-sealed wrap-flap closure, which is also a type of instant pivot fastening for pivot bindings. Adhesive closure strip **116**A and peel-off ribbon **116**B provide for user-assembly by the consumer or user of the binder **28**. User-assembly provides efficient packaging options and consumer choice. Consumers can coordinate various skeletons **1450** with corresponding covers **2800** which each preferably come in different colors, materials, or textures. Consumers can also select skeletons with a desired ring size or optional actuator to open the rings together. This consumer choice is particularly preferred for assembling report binders. Optional stick-resistant peel-off ribbon **116**B is unnecessary when adhesive closure strip **116**A is water-activated such as for old-fashioned postage stamps. Optional peel-off ribbon **116**B is also unnecessary when cover **2800** is pre-assembled with skeleton **1450** before going to market, as is the likely case for paper-filled notebook binders. For conduit casings **314** made from plastic, a possible alternative closure means to adhesive closure strip **116**A is a zipper lock typical of cellophane sandwich bags. Conduit casing **314** has slots **958**. Slots **958** are preferably integrally formed and extended with slits **115**. To assemble the binder **28**X, rings **1246** of skeleton **1450** are placed into corresponding slots **958** of conduit casing **314** entering from the interior side of back cover **2040** until spine **1153** comes into contact with conduit casing **314**. Slits **115** temporarily expand to extend slots **958** when inserting and passing rings **1246** through conduit casing **314**. If present, optional peel-off ribbon **116**B is removed from adhesive closure strip **116**A and conduit casing **314** is then wrapped about spine **1153** and a planar portion of conduit casing **314** is bonded to interior surface **2040**N of back cover portion **2040**A as shown in FIG. **48**B. After adhering conduit casing **314** to interior surface **2040**N of back cover **2040**, slits **115** are preferably very narrow to provide a smooth writing surface near rings **1246**. Upon assembly, a wrapping portion of conduit casing **314** defines conduit **756** and conduit casing **314** remains substantially planar with back cover portion **2040**A. Skeleton **1450** is a type of pivot binding with independently openable rings. Spine **1153** of skeleton **1450** is rotatably disposed in conduit **756** as a pivot about which back cover **2040** rotates. Skeleton **50** of FIG. **1**G with an actuator to open rings **46** together is another type of pivot binding. Additionally, by adjusting the number of slots **958**, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1450**. FIG. **48**D shows a perspective view of optional funnel-shaped sliding zipper tab **121** which

can be incorporated with skeleton **1450**. The funnel shape of sliding zipper tab **121** enables it to push rings segments **1246**A-**1246**B together to close ring **1246** as zipper tab **121** is pulled over disengaged ring segments **1246**A-**1246**B with a sliding zipper motion. Zipper tab **121** has ring-opening wedge **121**A which forces open rings **1246** when the zipper motion is reversed in the opposite direction. When incorporating optional zipper tab **121** with skeleton **1450**, zipper-tab stops or terminus, which are not shown, must be added to opposite ends of spine **1153** to retain zipper tab **121** on skeleton **1450** by blocking it from sliding off either end of skeleton **1450**. Zipper tab **121** together with added zipper-tab stops and many closely spaced rings **1246** having snap interlocks **208** serve as a sequential switching element or sequential actuator for opening rings **1246** in rapid sequence via zipper action. Optional front cover **1244** is similar to front cover **444** of FIG. **6**A, but it has more loose-leaf holes **74**A shown in FIG. **6**A corresponding to the number of rings **1246** of skeleton **1450**. Optional front cover **1244** is attached to binder **28**X by opening rings **1246** and hanging front cover **1244** in loose-leaf manner on rings **1246** as in FIG. **48**B. Upon assembly, the binder **28**X operates similar to the binder **6** of FIGS. **6**A-**6**B during usage, except that rings **1246** are opened and closed individually.

FIGS. **49**A-**49**E

FIGS. **49**A-**49**E show perspective and bottom views of another preferred embodiment of a binder **29**X of the present invention. The binder **29**X is designed to be inexpensive and extra thin when closed, especially suitable as a report binder. The binder **29**X comprises cover **2900** and skeleton **1550**. Cover **2900** comprises back cover **2140**, middle cover **2242**, and front cover **1344** and is preferably made from cardboard or plastic sheet to reduce cost. Skeleton **1550** is an inexpensive single piece of molded PVC plastic. Skeleton **1550** is substantially the same as Skeleton **1450** of FIG. **48**C with the exception that its rings **1346** have an oblong oval or elliptical shape. The size of ring **1346** affects the thickness of binder **29**X when closed as evident in FIG. **49**B. Likewise, the size and shape of rings **1346** largely depend upon hole-edge margin **117** of target loose-leaves **72** for use with the binder **29**X. Hole-edge margin **117** of target loose-leaf **72** is the shortest distance between the punched holes and the nearest edge of target loose-leaf **72**. For example, for U.S. binders targeted to hold 3-hole letter-size loose-leaves **72**, the industry standard hole-edge margin **117** is one-quarter inch and for European binders targeted to hold 2-hole or 4-hole A-4 size loose-leaves **72**, the industry standard hole-edge margin **117** is 8 mm. As shown in FIG. **49**D, the major inner diameter of rings **1346** (along the major axis of the elliptical shape of ring **1346**) is greater than twice hole-edge margin **117** of target loose-leaves **72**, but the minor inner diameter of rings **1346** (along the minor axis of the elliptical shape of ring **1346**) is less than twice hole-edge margin **117** but greater than 1 times hole-edge margin **117** of target loose-leaves **72**. The significance of these dimensions relate directly to the ease of page turning when the binder **29**X is open 180 degrees as is implied in FIG. **49**D and to the resulting thickness of cover **2900** when closed about rings **1346** as indicated in FIG. **49**B. The minimum closed-cover thickness of the binder **29**X is limited by the smallest minor inner diameter of rings **1346** that still enables satisfactory page turning. FIG. **49**D and these mathematical inequalities suggest dimensional limits of ring **1346** for satisfactory page turning in relation to hole-edge margin **117** of loose-leaves **72**. Related to these inequalities and experience, preferred rings for extra-thin covers have a ratio of major diameter to minor diameter in the range of 1.75-2.25. FIG. **49**E shows skeleton **1550** as initially molded. When the binder **29**X is assembled, middle cover **2242** and back cover **2140** share conduit casing **414**, which is made of a sheet of flexible foldable material. Back cover **2140** has back cover portion **2140**A and a portion of conduit casing **414** upon assembly. Conduit casing **414** has adhesive attachment strips **216**A to affix conduit casing **414** to its complementary or remaining bulk portion of cover **2900** upon assembly. Optionally, if the binder **29**X is to be user-assembled, an adhesive strip **216**A on one side of conduit **856** will have a corresponding stick-resistant shield like peel-off ribbon **116**B of FIG. **48**D to become an adhesive closure strip to enable the user to seal close conduit casing **414** about spine **1153**. Back cover **2140** has optional pocket **2140**P. Conduit casing **414** has pocket-spanning gap **118** to allow a broader opening to back cover pocket **2140**P. Upon assembly, cover **2900** defines conduit **856** where spine **1153** of skeleton **1550** is rotatable disposed. Conduit casing **414** has slots **1058**A-**1058**C to accommodate rings **1346**. Cover folds **2242**A and **2140**B border conduit **856**. Two very close roughly 90-degree folds **2242**A and **2140**B add up to one 180-degree cover fold or edge **2242**B when cover **2900** is folded open 360 degrees as exemplified in FIG. **49**C. Folds **2242**A and **2140**B along with the limited rotation of spine **1153** within conduit **856** enable rings **1346** to rotate about edge fold **2140**B of planar back cover portion **2140**A as shown in FIGS. **49**B-**49**C.

FIGS. **50**A-**50**B

FIGS. **50**A-**50**B show bottom views of another preferred embodiment of a binder **30**X of the present invention. The binder **30**X comprises cover **3000** and skeleton **1550**. Consistent with the binder **29**X of FIG. **49**A-**49**E, skeleton **1550** is again preferred because the binder **30**X is also designed to have an extra thin closed cover thickness popular for report binders. Cover **3000**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**L, offers a simplified means of binder assembly relative to cover **100** and is preferably made from one sheet of cardboard or similar material to reduce cost. Cover **3000** comprises front cover **1344**, middle cover **2342**, and back cover **2240**. Middle cover **2342** joins back cover **2240** at fold **2240**B. Back cover **2240** has back cover portion **2240**A and conduit casing **514**. Back cover portion **2240**A comprises two planar bonded layers of the one sheet via permanent fold **2240**C. Conduit casing **514** is integrally formed with and extends from the inner layer of back cover portion **2240**A. A planar portion of conduit casing **514** has adhesive closure strip **316**A and optional stick-resistant peel-off ribbon **316**B. Conduit casing **514** and adhesive closure strip **316**A make up another instant user-sealed wrap-flap closure. Conduit casing **514** has the shape of an acute spiral triangle, which enables back cover **2240** to have a fairly smooth writing surface for loose-leaves **72** as shown in FIG. **50**B. Upon assembly, a wrapping portion of conduit casing **514** defines conduit **956**, where spine **1153** of skeleton **1550** is rotatably disposed. Additionally, with little or no modification, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1550**.

FIGS. **51**A-**51**B

FIGS. **51**A-**51**B show bottom views of another preferred embodiment of a binder **31**X of the present invention. The binder **31**X comprises cover **3100** and skeleton **1550**. Like binder **29**X of FIG. **49**A-**49**E, the binder **31**X employs skeleton **1550** to facilitate its extra thin closed cover thickness popular for report binders. Cover **3100**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**L, offers a simplified means of binder assembly relative to cover **100**

and is preferably made from thin sheet material to reduce cost. Cover **3100** comprises front cover **1444**, middle cover **2442**, and back cover **2340**. Front cover **1444** has transparent portion **1444**A attached to opaque portion **1444**B via staples **168**. Middle cover **2442** joins back cover **2340** at fold **2340**B. Back cover **2340** has back cover portion **2340**A and conduit casing **614**. Conduit casing **614** is integrally formed with back cover portion **2340**A to provide the planar interior surface of back cover **2340**. A planar portion of conduit casing **614** has adhesive closure strip **416**A and optional stick-resistant peel-off ribbon **416**B. Conduit casing **614** and adhesive closure strip **416**A make up another instant user-sealed wrap-flap closure. Upon assembly, a wrapping portion of conduit casing **614** defines conduit **1056**, where spine **1153** of skeleton **1550** is rotatably disposed. Additionally, with little or no modification, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1550**.

FIGS. **52**A-**52**B

FIGS. **52**A-**52**B show perspective views of another preferred embodiment of a binder **32**X of the present invention and a sample pocketed folder for its attachment. The binder **32**X comprises cover **3200** and skeleton **1550**. Cover **3200** is a slight variant of cover **600** of the binder **6** of FIGS. **6**A-**6**B. Cover **3200** comprises back cover **2440**, folder-attachment flaps **178**A, and pocket-spanning gap **218**. Back cover **2440** defines conduit **1156** where spine **1153** of skeleton **1550** is rotatably disposed. Back cover **2440** has slots **1158**A-**1158**C to accommodate rings **1346**. Folder attachment flaps **178**A have adhesive attachment strips **516**A and corresponding stick-resistant peel-off ribbons **516**B, which provide an easy means of attaching the binder **32**X to folders, especially a pocket-enhanced folder **3200**F such as shown in FIG. **52**B. Folder **3200**F has pocket **3200**P and recommended attachment areas **178**B for attachment by flaps **178**A. Pocket-spanning gap **218** provides a broader opening to folder pocket **3200**P. Cover **3200** is also a wide universally attachable conduit casing **714**, which along with its skeleton **1550** can transform user-selected complementary cover portions such as assorted folders or singular planar sheet by its mere attachment into a binder without the need of a specialized corresponding reciprocal attachment element such as for a hooks **90** and loops **91** fastener of FIG. **8** or rivet **69** and hole **113**A attachment of FIG. **46**A-**4.6**B. Given their functional convenience, flaps **178**A plus adhesive strips **516**A make up an instant user-affixed adhesive attachment. Additionally, with little or no modification to cover **3200**, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1550**.

FIGS. **53**A-**53**E

FIGS. **53**A-**53**E show perspective and bottom views of another preferred embodiment of a binder **33**X of the present invention with both essential and optional components. The binder **33**X comprises cover **3300** and skeleton **1650**. Skeleton **1650** has oblong reversibly compressible rings **1446** threaded by singular rod spine **1253**. Each ring **1446** is a single piece of plastic. Rings **1446** are oval and largely reversibly deformable under typical vertical compressive forces exerted on rings **1446** and binder **33**X during use. An example of such compressive force might be found if binder **33**X is crammed into a crowded briefcase or bookshelf. However, depending upon the precise construction and material properties of ring **1446**, much if not most of the reversible deformation of rings **1446** may occur simply by closing the cover **3300** which can act like a nutcracker to compress rings **1446**. As exemplified by FIGS. **53**C-**53**D, the vertical reversible deformation of rings **1446** facilitates the design of ultra thin, closed cover **3300** that is even thinner than extra thin closed cover **2900** with rings **1346** of FIGS. **49**A-**49**E. Comparing rigid rings **1346** of skeleton **1550** of FIGS. **49**B and **50**B with reversibly compressible rings **1446** of skeleton **1650** of FIGS. **53**C-**53**D indicates that compressible rings **1446** provide improved page turning via the additional clearance afforded compressible rings **1446** for a particular closed cover thickness, especially when loose-leaves **72** are concurrently located above and below respective back covers. Preferably, the maximum reversible deformation or maximum reversible compressibility of ring **1446** in the direction of its minor diameter is in a range of 15%-50%. Like oblong ring **1346** of FIG. **49**D, the major inner diameter of oblong ring **1446** is greater than twice hole-edge margin **117** of target loose-leaves **72**, but the minor inner diameter of ring **1446** under substantial reversible deformation as shown in FIG. **53**C is less than twice hole-edge margin **117** and the minor inner diameter of ring **1446** when freely expanded as shown in FIG. **53**D is greater than 1 times hole-edge margin **117**. Two different minor inner diameters are used in these mathematical inequalities because the minimum thickness of the closed binder **33**X is achieved when closed cover **3300** and rings **1446** are compressed, but pages of binder **33**X are turned when cover **3300** is open and rings **1446** are freely expanded. The minor inner diameter under reversible deformation is compared to be less than twice hole-edge margin **117** because this condition is related to the objective of constructing a thin cover and distinguishes ring **1446** from conventional circular rings, but the minor inner diameter of the freely expanded ring is compared to be greater than one times hole-edge margin **117** because this condition is related to satisfactory page turning. Accordingly, the reversibly deformable rings **1446** facilitate easy page turning implied in FIG. **53**D and facilitate the construction of ultra thin cover **3300** as indicated by FIG. **53**C. When upright as shown in FIGS. **53**A-**53**B, rings **1446** have column-like roughly vertical thick ring portions **1446**P-**1446**Q that taper to roughly horizontal thin bow-like ring portions **1446**R-**1446**S to facilitate reversible deformation. The relatively thicker column-like vertical ring portions **1446**P-**1446**Q resist permanent buckling under typical vertical compressive forces while the relatively horizontal thin bow-like ring portions **1446**R-**1446**S easily flatten under these same vertical compressive forces and spring back upon their removal to provide the majority of the desired reversible deformation as shown in FIGS. **53**C-**53**D. Ring **1446** has tab **247** and corresponding slot **248**, which snap fit together forming interlock **308** to securely close ring **1446**. Ring **1446** has neck **1446**N adjacent tab **247**. Neck **1446**N can be lengthened to make interlock **308** into a telescopic linkage like interlock **408** of FIGS. **59**A-**59**B, which increases the range or extent of reversible deformation that ring **1446** can undergo. Interlock **308** is suitably located on vertical ring portion **1446**Q where vertical compressive force tends to reinforce ring closure, but this location also enables horizontal portion **1446**R to be thinner and more elastic than otherwise to facilitate reversible deformation. Ring **1446** has thread hole **157** for threading ring **1446** on rod spine **1253**. Spine **1253** is a type of orthogonal base for ring **1446** to facilitate pivoting; alternatively, if spine **1253** is replaced by a wider orthogonal base with rivet holes, rings **1446** can be attached to a cover in a fixed conventional manner that prohibits pivoting but still facilitates the design of an ultra thin binder cover. In a preferred manufacturing method, rings **1446** are extruded as a plastic shaft with a roughly C-shaped cross-section, which is sliced into roughly

C-shaped open rings whose two free ends are then punch-cut into opposing tabs **247** and slots **248**. Cover **3300**, which is a slight variant of cover **100** of the binder **1** of FIGS. **1**A-**1**L, offers a simplified means of binder assembly relative to cover **100** and is preferably made from thin sheet material to reduce cost. Cover **3300** comprises front cover **1344**, middle cover **2542**, and back cover **2540**. Middle cover **2542** borders edge-fold **2540**B to enable front cover **1344** and middle cover **2542** to fold flatly open 360 degrees up against back cover **2540** as shown in FIG. **53**D. Back cover **2540** has back cover portion **2540**A and attached conduit casing **814**. Conduit casing **814** has a roughly P-shaped cross-section and is preferably made of a fairly flexible material. Conduit casing **814** has tubular portion **814**B, which defines conduit **1256** where spine **1253** of skeleton **1650** is rotatably disposed. Conduit casing **814** has slots **1258**A-**1258**C to accommodate rings **1446**. Additionally, with little modification to cover **3300** beyond increasing its closed cover thickness, skeleton **50** of FIG. **1**G and others disclosed herein can be substituted for skeleton **1650**. Notably, conduit casing **814** is attached to back cover portion **2540**A near edge **814**A, which enables the opposite free tubular portion **814**B to be lifted by middle cover **2542** when cover **3300** is closed as shown in FIG. **53**C and which enables tubular portion **814**B to dangle or droop around edge-fold **2540**B when cover **3300** is folded open 360 degrees in a flat formation as shown in FIG. **53**D. Tubular portion **814**B becomes substantially flush with back cover **2540** and middle cover **2542** of the flat formation of cover **3300** shown in FIG. **53**D. Conduit casing **814** is attached to back cover portion **2540**A via optional adhesive attachment strip **616**A. Conduit casing **814** is preferably attached to back cover portion **2540**A via plastic weld or fusing when using plastic or adhesive when using other materials. By incorporating a instant user-affixed attachment such as adhesive attachment strips **616**A coordinated with corresponding stick-resistant peel-off ribbons **516**B of FIG. **52**A, conduit casing **814** can also be produced for sale as a standalone product for subsequent attachment by users to folders **3200**F of FIG. **52**B. A instant user-affixed attachment is alternatively aptly called an assembly-deferred after-sale attachment. Deferring assembly provides users with coveted consumer choice, allowing users to select the complementary cover portion to which conduit casing **814** and rings **1446** are to be attached. Conduit casing **814** has optional pocket-spanning gap **318** for use with pocket-enhanced folders **3200**F of FIG. **52**B. The binder **33**X operates similar to the binder **1** of FIGS. **1**A-**1**L, but its rings **1446** are opened and closed individually and its ultra thin closed cover **3300** uses less space during packing, storage, and transport.

FIG. **53**E shows another preferred embodiment of a conduit casing **914**, attached to back cover portion **2540**A, for use with cover **3300** and other covers disclosed herein. Conduit casing **914** is made of a resilient semi-rigid material. Conduit casing **914** defines conduit **1356** and has longitudinal opening or aperture **204** with which to receive spine **1253** and other spines disclosed herein. Conduit **1356** receives spine **1253** via snap-insert action where aperture **204** temporarily expands during forced insertion of spine **1253**. Conduit casing **914** and resiliently expandable aperture **204** make up a resilient snap-in clasp closure, which is also another type of instant pivot fastening. After insertion, the semi-rigid conduit casing **914** is firm enough to retain and support spine **1253** during normal usage. Conduit casing portion **914**B is reduced in thickness for increased flexibility to act like a hinge between the majority of conduit casing **914** and back cover **2540** to enable spine insertion and to function similar to conduit casing **814** as shown in FIGS. **53**C-**53**D.

FIGS. **54**A-**54**K

FIGS. **54**A-**54**K show perspective and bottom views of another preferred embodiment of a binder **34**X of the present invention with both essential and optional components. The binder **34**X comprises cover **3400** and the skeleton **1750**. Consistent with the binder **33**X of FIG. **53**A-**53**D, the binder **34**X employs a skeleton **1750** having reversibly compressible rings **1546** to facilitate the ultra thin closed cover thickness of the binder **34**X popular for report binders. Cover **3400** is a slight variant of ultra thin cover **3300** of FIGS. **53**A-**53**D. Like cover **3300**, cover **3400** comprises the same back cover **2540**, but includes different middle cover **2642** and front cover **1544**. Middle cover **2642** and front cover **1544** join at primary cover fold **1544**A and are bowed about rings **1546** of skeleton **1750** when cover **3400** is closed as in FIG. **54**A in an aesthetically pleasing streamline contour. Also, like cover **3300**, middle cover **2642** joins back cover **2540** at edge-fold **2540**B. Notably, tubular portion **814**B of conduit casing **814** is lifted by middle cover **2642** when cover **3400** is closed as shown in FIG. **54**A and dangles or droops around edge-fold **2540**B when cover **3400** is folded open 360 degrees in a flat formation as shown in FIG. **54**D. Tubular portion **814**B becomes substantially flush with back cover **2540** and middle cover **2642** of the flat formation of cover **3400**. Spine **1353** of skeleton **1750** is rotatably disposed in conduit casing **814** of back cover **2540** as a pivot about which cover **3400** is rotatable.

FIG. **54**B shows a perspective view of optional ring-crush resister **119** for use with cover **3400**. FIGS. **54**C-**54**D show bottom views of cover **3401**. Cover **3401** comprises cover **3400** plus ring-crush resister **119**. Ring-crush resister **119** has four sections divided by three parallel hinge-like folds. Two sections of ring-crush resister **119** are attachment flaps **119**A-**119**B and the other two sections are ring-crush resister portions **119**C-**119**D. Attachment flaps **119**A and **119**B are attached to front cover **1544** and middle cover **2642**, respectively, preferably via plastic weld or adhesive to form tetragonal tube **119**T. Although tetragonal tube **119**T has roughly a tetragon cross-section, two sides of tube **119**T are tensilely straightened when cover **3401** is closed under sufficient vertical compressive force such that tube **119**T supports cover **3401** in the manner of a triangular truss as shown in FIG. **54**C to oppose excessive deformation of rings **1546**. These two straightened sides are ring-crush resister portion **119**C and the portion of front cover **1544** that coincides with a portion of tetragonal tube **119**T. When tube **119**T assumes its roughly triangular shape of FIG. **54**C, it shares loading of compressive force exerted on cover **3401** with rings **1546**. Tube **119**T serves to prevent or inhibit permanent deformation of rings **1546** that may result from excessive compressive force exerted on closed cover **3401** roughly in the direction of the minor axis of rings **1546**. Permanent deformation may include creases in rings **1546** which degrade the page-turning suitability of rings **1546**. Note, ring-crush resister portion **119**D is appropriately thick and rigid whereas ring-crush resister portion **119**C can be thinner and more flexible because ring-crush resister portion **119**D is under compression and ring-crush resister portion **119**C is under tension when sufficient compressive force is exerted on closed cover **3401** roughly in the direction of the minor axis of rings **1546**. When cover **34.00** is open 180 degrees or 360 degrees, tetragonal tube **119**T folds flatly as shown in FIG. **54**D to enable loose-leaves **72** to lie fairly

flatly against front cover **1544** and middle cover **2642**. Ring-crush resister **119** has slots **1358**T-**1358**V to accommodate rings **1546** when tube **119**T is erect as when cover **3401** is closed. Slots **1358**T-**1358**V are preferably funnel-shaped to guide rings **1546** into slots **1358**T-**1358**V as cover **3401** is closed. Preferably, slots **1358**T-**1358**V fit snugly about rings **1546** to inhibit the pitch lean or tilt of rings **1546** towards the longitudinal axis of spine **1353** when compressive force is exerted on rings **1546** in the direction of the minor axis of rings **1546**.

FIG. **54**E shows a bottom views of optional tubular ring-crush resister **219** for use with cover **3400**. FIG. **54**F shows a bottom view of cover **3402**. Cover **3402** comprises cover **3400** plus tubular ring-crush resister **219**. Tubular ring-crush resister **219** has adhesive attachment strip **219**A spread across fold **219**B. Ring-crush resister **219** is adhesively attached to cover **3400** such that fold **219**B coincides with cover fold **1544**A. Similar to tetragonal tube **119**T of FIGS. **54**C-**54**D, tubular ring-crush resister **219** has a roughly tetragonal cross-section, but two sides of ring-crush resister **219** are tensilely straightened, when closed cover **3402** is under sufficient compressive force, such that ring-crush resister **219** supports cover **3402** in the manner of a triangular truss as shown in FIG. **54**F for the same functional reasons that tube **119**T supports cover **3401** in FIG. **54**C. Tubular ring-crush resister **219** has four side portions divided by four hinge-like folds and is made of a single sheet of material. Ring-crush resister portion **219**D is made thicker and more rigid by overlapping and bonding several layers of the sheet of material together to better withstand compression during use. Ring-crush resister **219** has slots similar to slots **1358**T-**1358**V of ring-crush resister **119**. When cover **3402** is open 180 degrees or 360 degrees, ring-crush resister **219** is folded flat as shown in FIG. **54**E similar to tube **119**T of FIG. **54**D.

FIG. **54**G shows a bottom view of conduit casing **1014** in which skeleton **1750** is retained. Conduit casing **1014** is integrally formed with roof-like or arch ring-crush resister **319**. FIGS. **54**H-**54**I show bottom views of cover **3403** joined to skeleton **1750**. Cover **3403** is similar to cover **3400** of FIG. **54**A, but substitutes conduit casing **1014** in place of conduit casing **814**. Cover **3403** comprises front cover **1544**, middle cover **2642**, back cover portion **2540**A, and conduit casing **1014**. Conduit casing **1014** is attached to back cover portion **2540**A near hinge-like portion **1014**A. Conduit casing **1014** defines conduit **1456** where spine **1353** of skeleton **1750** is rotatably disposed. Conduit casing **1014** has longitudinal opening **304** with which to receive spine **1353** during assembly. Conduit casing **1014** has spring arm **1014**B, which lifts skeleton **1750** relative to arch ring-crush resister **319** as shown in FIG. **54**G to provide extra page-turning clearance over arch ring-crush resister **319** when cover **3403** is open. When cover **3403** is closed under sufficient compressive force, cover **3403** compresses rings **1546**, which in turn push spring arms **1014**B down against middle cover **2642**. When the height of any of the compressed rings **1546** as measured along their minor axes is the same as the height of arch ring-crush resister **319** as shown in FIG. **54**H, arch ring-crush resister **319** shares loading of the compressive force with rings **1546** to prevent or inhibit permanent deformation of rings **1546**. When cover **3403** is folded flatly open 360 degrees, hinge-like portion **1014**A enables conduit casing **1014** to dangle or droop down around edge-fold **2540**B where it is fairly flush with the flat formation of cover **3403**. Middle cover **2642** lifts conduit casing **1014** upright when cover **3403** is closed.

FIG. **54**J shows a bottom view of cover **3404**. Cover **3404** comprises cover **3400** plus ring-crush resister **419**. Ring-crush resister **419** includes ridges **419**A-**419**B, which are attached to cover **3400** immediately adjacent fold **1544**A. The close proximity of ridges **419**A-**419**B to fold **1544**A prevents fold **1544**A from being sharp and narrow. The well-rounded fold **1544**A limits very narrow closure of cover **3404** about rings **1546** when skeleton **1750** is added, which inhibits permanent deformation of rings **1546**.

FIG. **54**K shows a perspective view of another preferred embodiment of a skeleton **1750** of the binder of the present invention. Skeleton **1750** is a single piece of molded plastic. Skeleton **1750** has a thin cylindrical spine **1353**, which attaches to each of a plurality of binder rings **1546**. Rings **1546** comprise rings segments **1546**A-**1546**B and the portion of spine **1353** they intersect. Notably, the cross-sectional diameter of spine **1353** is approximately equal to the prong thickness of ring segment **1546**A where they intersect. Rings **1546** are shaped similar to rings **1446** of FIGS. **53**A-**53**D for the same functional reasons described for rings **1446** related to compressibility and page-turning. Both have bow-like roughly horizontal thin portions and column-like roughly vertical thick portions when they are closed and upright. Rings **1546** have the same tabs **147** and slots **148**, which snap fit together to form interlock **208** as rings **1246** of FIG. **48**C. Additionally, rings **1546** have butterfly-shaped or bowtie-shaped flip-top hinge **120** which functions to enable rings **1546** to flip open similar to well-known plastic flip-top caps of plastic tubes and bottles popular for packaging cream, gel, and liquid products.

With little or no modification to cover **3400**, skeleton **1650** of FIG. **53**A and others disclosed herein can be substituted for skeleton **1750**. The binder **34**X operates similar to the binder **33**X of FIGS. **53**A-**53**D.

FIGS. **55**A-**55**B

FIGS. **55**A-**55**B show views of another preferred embodiment of a ring **1646** of the binder of the present invention positioned upright with its minor dimension or minor diameter oriented vertically and corresponding perpendicular major dimension oriented horizontally. Plastic ring **1646** is oblong and reversibly deformable under vertical compressive force for the same functional reasons as ring **1346** of FIG. **49**D and ring **1446** of FIG. **53**B. Ring **1646** is shaped like a rounded rectangle and intersects hinged spine **1153** shown in FIG. **48**C. When closed and upright, ring **1646** has column-like roughly-vertical thick portions **1646**P-**1646**Q that resist buckling and has bow-like roughly-horizontal thin portion **1646**R that flattens and springs back easily in cooperation with roughly-horizontal hinged portion **1646**S to facilitate reversible deformation of ring **1446** when vertically compressed. Thick hinged portion **1646**S cooperates with bow-like portion **1646**R by letting vertical thick portions **1646**P-**1646**Q tilt outward, when ring **1646** is under vertical compressive force, until restrained by thin portion **1646**R that is straightened taut as shown in FIG. **55**B. Ring **1646** has the same tab **147** and slot **148** which snap fit together to form interlock **208** as rings **1246** of FIG. **48**C. Interlock **208** is suitably located on vertical ring portion **1646**Q where vertical compressive force tends to reinforce ring closure.

FIGS. **56**A-**56**B

FIGS. **56**A-**56**B shows views of another preferred embodiment of a ring **1746** of the binder of the present invention positioned upright with its minor dimension or minor diameter oriented vertically and corresponding perpendicular major dimension oriented horizontally. Oblong

ring **1746** is very similar to ring **1446** of FIG. **53**B, but has a roughly trapezoidal shape for enhanced page turning. Like ring **1446**, ring **1746** intersects spine **1253** via thread hole **157**, has tab-slot interlock **308**, and is reversibly deformable under typical vertical compressive forces exerted on ring **1746** during use. Ring **1746** has roughly vertical column-like portions **1746**P-**1746**Q that are relatively thicker than its roughly horizontal bow-like portions **1746**R-**1746**S. The thick column-like portions of ring **1746** lean slightly inward when ring **1746** is freely expanded as in FIG. **56**A, but spread outward to become more vertical when ring **1746** is under vertical compressive force as in FIG. **56**B.

FIGS. **57**A-**57**B

FIGS. **57**A-**57**B show views of another preferred embodiment of a ring **1846** of the binder of the present invention positioned upright with its minor dimension or minor diameter oriented fairly vertically and corresponding perpendicular major dimension oriented fairly horizontally. Oblong ring **1846** is very similar to ring **1446** of FIG. **53**B, but has a shoe-shaped perimeter when freely expanded as in FIG. **57**A. Like ring **1446**, ring **1846** intersects spine **1253** via thread hole **157**, has tab-slot interlock **308**, and is reversibly deformable under typical vertical compressive forces exerted on ring **1846** during use. FIG. **57**B shows ring **1846** deformed under vertical compressive force. Ring **1846** has roughly vertical column-like portions that are relatively thicker than its roughly horizontal bow-like portions. The heel-like portion of ring **1846** is adapted to set its loose-leaf **72** capacity whereas the wide-sole-like portion of ring **1846** is shaped for nimble page turning. The thick rigid heel-like portion of ring **1846** also minimizes the shifting of loose-leaves compared to ring **1546** of FIG. **54**K when similarly compressed.

FIGS. **58**A-**58**B

FIGS. **58**A-**58**B show views of a further preferred embodiment of a ring **1946** of the binder of the present invention positioned upright with its minor dimension or minor diameter oriented vertically and corresponding perpendicular major dimension oriented horizontally. Oblong ring **1946** is very similar to ring **1546** of FIG. **54**K, but roughly has the shape of a carriage-suspension or rhombus when freely expanded as in FIG. **58**A. Ring **1946** comprises ring segments **1946**A-**1946**B joined by a simple strip hinge **220**. Like ring **1546**, ring **1946** intersects spine **1353**, has tab-slot interlock **208** and is reversibly deformable under typical vertical compressive forces exerted on ring **1946** during use. When upright and closed, ring **1946** has roughly vertical column-like portions that are relatively thicker than its roughly horizontal bow-like portions and the largely symmetrical carriage-suspension shape is suitably designed for reversible vertical compression.

FIGS. **59**A-**59**B

FIGS. **59**A-**59**B shows views of another preferred embodiment of a ring **2046** of the binder of the present invention positioned upright with its minor dimension or minor diameter oriented vertically and corresponding perpendicular major dimension oriented horizontally. Oblong ring **2046** is similar to ring **1546** of FIG. **54**K, but has a roughly triangular shape when freely expanded as in FIG. **59**A. Ring **2046** comprises ring segments **2046**A-**2046**B joined by a simple strip hinge **220**. Like ring **1546**, ring **2046** intersects spine **1353** and is reversibly deformable under typical vertical compressive forces exerted on ring **2046** during use. When upright and closed, ring **2046** has roughly vertical column-like portions that are relatively thicker than its roughly horizontal bow-like portions. Ring **2046** has the same tab **147** and slot **148** as ring **1546**, but incorporates long neck **2046**N to yield telescopic interlock **408**, which enhances the ability of ring **2046** to expand and compress while remaining closed. Telescopic interlock **408** provides for both increased loose-leaf **72** capacity and improved page turning.

FIG. **60**

FIG. **60** shows a perspective view of another preferred embodiment of a ring **2146** of the binder of the present invention positioned upright with its minor dimension or minor diameter oriented vertically. Oblong ring **2146** intersects fulcrum **122**. A set of oblong rings **2146**, each with an individual fulcrum acting as an axial portion for pivoting, is another type of pivot binding. Fulcrum **122** is also a type of orthogonal base. Oblong ring **2146** is has a roughly rectangular shape with a major diameter and a minor diameter comparable to corresponding diameters of ring **1346** of FIG. **49**D for the same functional reasons. Ring **2146** incorporates elastic spiral closure **508**. Ring **2146** is inexpensively made from flat sheet plastic of uniform thickness. As a typical use example, fulcrum **122** can be rotatably disposed in conduit **856** of cover **2900** of FIG. **49**A or, alternatively, fulcrum **122** can be stapled along a fold of a cover in similar manner to the attachment of skeleton **550** to cover **2300** of FIGS. **23**A-**23**E.

While my above descriptions contain many specificities, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of several preferred embodiments thereof. Many other variations are possible. For example, reversibly compressible rings can be attached to wide fixed-attachment spines and still facilitate the design of ultra thin covers. Likewise, specific ring-crush resisters disclosed herein can be incorporated in ultra thin covers of binders with fixed-attachment spines. Conventional fixed-attachment spines are a type of orthogonal base for rings. Resilient curl snap-in claps can be modified to have an eagle-claw or horseshoe cross-section.

It will be appreciated by persons skilled in the art that herein described is a loose-leaf binder and analogous products and method of use. While the present invention has been described by reference to various preferred embodiments, it will be understood by persons skilled in the art that many modifications and variations may be made in those preferred embodiments without departing from the spirit and scope of the present invention. Accordingly, it is intended that the invention not be limited to the disclosed preferred embodiments and that it have the full scope permitted by the following claims.

I claim:

1. A binder for releasably binding a plurality of loose-leaves comprising:

a conduit casing having a conduit;

a spine embedded within said conduit;

a plurality of binder rings attached to said spine;

each of said binder rings rotatable relative to said conduit;

an actuator for opening all of said binder rings substantially together;

said spine is rotatably disposed in said conduit as a pivot about which said conduit casing is rotatable;

said conduit casing is made of a sheet of material and has a wrapping portion defining said conduit and a planar portion, thickness of said sheet when said wrapping portion is unwrapped is less than diameter of said conduit;

said planar portion for attaching said conduit casing with a complementary cover portion during subsequent assembly;

whereby a subassembly can be manufactured independently of said complementary cover portion to facilitate efficiencies in component manufacturing, packaging, distribution and assembly.

2. The binder of claim **1** further comprising a complementary cover portion with an open-groove conduit adjacent a fold; said wrapping portion shaped as a tubular portion; said conduit casing is attached to said complementary cover portion such that said open-groove conduit receives said tubular portion; whereby said conduit casing is positioned more flush with surfaces of said complementary cover portion.

3. A binder for releasably binding a plurality of loose-leaves comprising:

a cover comprising a back cover, a middle cover, and a front cover;

a plurality of binder rings;

said middle cover joins said back cover to said front cover;

said back cover has a conduit casing with a tubular portion and a substantially planar portion;

said conduit casing attached to said back cover near an edge of said planar portion remotely opposite said tubular portion;

said conduit casing defines a conduit and a plurality of slots, each of said slots receiving at least a portion of one of said binder rings;

each of said binder rings rotatably disposed about an axis located within said conduit;

said back cover separated from said middle cover by a fold;

said conduit casing is made of a flexible material and straddles said fold;

said tubular portion lifted by said middle cover when said cover is closed;

said tubular portion droops around said fold when said cover is folded flatly open 360 degrees along said fold;

whereby said tubular portion is substantially flush with flat formation of said cover.

4. A binder for releasably binding a plurality of loose-leaves comprising:

a conduit casing having a conduit;

a plurality of binder rings which are each openable and closable;

an instant user-affixed adhesive attachment for attaching said conduit casing to a surface;

said conduit casing is made of a sheet of flexible material;

said conduit casing has a wrapping portion and a substantially planar portion,

said wrapping portion defines said conduit;

said planar portion has said instant user-affixed adhesive attachment;

each of said binder rings substantially rotatable about an axis located within said conduit;

said conduit casing defines a plurality of slots, each of said slots intersecting said conduit and receiving at least a near portion of one of said binder rings;

a remote portion of each of said binder rings is rotatable about an edge of said conduit casing;

whereby said instant user-affixed adhesive attachment offers ready, quick and easy mounting of said conduit casing with said binder rings upon a user-selected complementary cover portion such as a file folder.

5. The binder of claim **4** wherein said flexible material selected from the group consisting of canvas, paper, card, cardboard, plastic, vinyl and fabric.

6. The binder of claim **4** further comprising a pocket spanning gap;

whereby said pocket spanning gap facilitates increased access to pockets when said conduit casing is attached to pocket-enhanced folders.

7. A loose-leaf binder cover comprising:

a substantially planar cover portion;

a conduit casing;

an instant pivot fastening;

said conduit casing is a cover portion that defines a conduit and is connected to said planar cover portion;

said conduit casing able to receive a user-selected compatible pivot binding having an axial portion and a plurality of openable binder rings such that said axial portion of said pivot binding able to be rotatably disposed in said conduit as a pivot about which said planar cover portion is rotatable;

said conduit casing defines a plurality of slots, each of said slots intersecting said conduit and able to receive at least a portion of one of said openable binder rings of said pivot binding;

said conduit casing is integrally formed with said instant pivot fastening;

said instant pivot fastening comprises a flexible material adjoining an aperture to said conduit, said flexible material yields sufficiently under manual manipulation without tools to open said aperture wide enough to receive said axial portion of said pivot binding into said conduit;

said instant pivot fastening has a ready closure means to narrow or close said aperture enough to securely fasten said axial portion of said pivot binding within said conduit while accommodating rotation of said binder rings;

said conduit is sized to snugly hold said axial portion of said pivot binding such that translational motion of said axial portion is restricted without hindering preset range of rotational motion of said binder rings;

said planar cover portion substantially wider than said conduit;

width of said slot not more than five times largest interspacing between said slots;

whereby at the time of binding loose-leaves, a user is provided with valued flexibility to choose appropriate said pivot binding especially with regard to ring-size and optional actuator.

8. The loose-leaf binder cover of claim **7** wherein said flexible material selected from the group consisting of canvas, paper, card, cardboard, plastic, vinyl and fabric.

9. The loose-leaf binder cover of claim **7** wherein said instant pivot fastening comprises an instant user-sealed wrap-flap closure; said wrap-flap closure comprises a wrapping portion made of a sheet of said flexible material, a free end of said wrapping portion has said ready closure means for attaching said free end to said planar cover portion to close said conduit, said ready closure means selected from the group consisting of self-adhesive, water-activated adhesive, removable adhesive, restickable adhesive, plastic zipper-lock, hooks and loops, tab and slot, flatly-spreadable two-prong fasteners, and snap fasteners.

10. The loose-leaf binder cover of claim **7** wherein said instant pivot fastening comprises a snap-in clasp closure; said snap-in clasp closure comprises a resilient material adjoining said aperture; said axial portion of said pivot

binding is snapped through transiently expandable said aperture into said conduit casing and secured via return to narrow form of said aperture.

11. A loose-leaf binder cover comprising:

a substantially planar cover portion;

a conduit casing;

an instant user-sealed wrap-flap closure;

said conduit casing defines a conduit and is connected to said planar cover portion;

said conduit casing able to receive a user-selected compatible skeleton having a spine attached to a plurality of openable binder rings such that said spine is able to be rotatably disposed in said conduit as a pivot about which said planar cover portion is rotatable;

said conduit casing defines a plurality of slots, each of said slots intersecting said conduit and able to receive at least a portion of one of said openable binder rings;

said conduit casing is integrally formed with said instant user-sealed wrap-flap closure;

said instant user-sealed wrap-flap closure is made from a sheet of flexible material and comprises a wrapping portion and an adjoining substantially planar free end;

said planar free end having a ready closure means for securely closing said conduit casing;

said ready closure means selected from the group consisting of self-adhesive, water-activated adhesive, removable adhesive, restickable adhesive, plastic zipper-lock, hooks and loops, tab and slot, flatly-spreadable two-prong fasteners and snap fasteners;

each of said plurality of slots has a closed perimeter when said wrapping portion is flatly unwrapped prior to assembly such that said conduit casing has continuous longitudinal portions one and two that are on opposite sides of said plurality of slots and that are parallel to longitudinal dimension of said conduit;

unwrapped length of said slots at least as long as an outer diameter of said plurality of binder rings;

whereby each of said continuous longitudinal portions one and two of said conduit casing are much easier to manipulate during assembly with said user-selected skeleton than an alternative comb-like portion with a discontinuous edge interrupted by numerous said slots especially when working with said flexible material.

12. A binder for releasably binding a plurality of loose-leaves comprising:

a cover having a conduit;

a skeleton having a spine and a plurality of binder rings;

each of said binder rings is openable and is attached to said spine;

said skeleton is a single piece of molded plastic;

each of said binder rings is substantially constrained to rotate with said spine when said binder rings are closed;

said cover defines a plurality of slots, each of said slots intersecting said conduit and receiving at least a portion of one of said binder rings;

said spine is rotatably disposed in said conduit as a pivot about which said cover is rotatable such that each of said binder rings is rotatable relative to said conduit;

said cover comprises a back cover with a planar portion alongside a wrapping portion, said wrapping portion defines said conduit;

said wrapping portion is made of a sheet of soft flexible material of substantially uniform thickness when flatly unwrapped;

said wrapping portion has end one and end two that are broad and parallel to the longitudinal dimension of said conduit;

both said end one and said end two of said wrapping portion are smoothly and rivetlessly attached to said planar portion of said back cover to structurally support said conduit.

13. The binder of claim **12** wherein said soft flexible material selected from the group consisting of canvas, paper, card, cardboard, plastic, vinyl and fabric.

14. The binder of claim **12** wherein said slots have slot-extending slits;

said slits are flexible to transiently expand enabling said binder rings to pass through said slots during assembly of said skeleton with said cover;

extended length of said slots including said slits at least as long as an outer diameter of said plurality of binder rings;

said slits are very narrow after completion of assembly of said skeleton with said cover such that opposite edges of said slit are so close as to provide a nearly smooth uninterrupted surface.

15. The binder of claim **12** wherein each of said plurality of slots has a closed perimeter when said wrapping portion is flatly unwrapped prior to assembly such that said cover has continuous longitudinal portions one and two that are on opposite sides of said plurality of slots and that are parallel to longitudinal dimension of said conduit;

unwrapped length of said slots at least as long as an outer diameter of said plurality of binder rings;

whereby each of said continuous longitudinal portions one and two of said cover are much easier to manipulate during assembly than an alternative comb-like portion with a discontinuous edge interrupted by numerous said slots especially when manipulating said soft flexible material.

16. The binder of claim **12** further comprising a sliding zipper tab; a pair of zipper-tab stops, said zipper tab stops located at opposite ends of said spine to retain said sliding zipper tab on said spine, said zipper tab slidable along said spine in either direction to open or close said binder rings in rapid sequence via zipper action.

17. A binder for releasably binding a plurality of loose-leaves comprising:

at least one ring that is openable and closable;

an orthogonal base;

a closure to secure ring closed;

said ring has an oblong perimeter;

said ring has a minor diameter defining an upright ring position when said minor diameter is substantially vertical;

said ring has roughly-vertical column-like thick portions when situated in said upright ring position;

said ring has a roughly-horizontal bow-like thin upper portion when situated in said upright ring position;

said ring has a roughly-horizontal extendable lower portion when situated in said upright ring position;

each of said column-like thick portions are on average thicker than said bow-like thin upper portion;

said orthogonal base perpendicularly intersects said lower portion of said ring;

said ring is reversibly compressible relative to a moderate compressive force roughly exerted in the direction of said minor diameter such that said column-like thick portions resist permanent buckling while said bow-like thin upper portion and said extendable lower portion more readily flatten and widen outward to provide most of desired reversible vertical compressibility and spring back to resume relaxed expanded form of said ring upon removal of said moderate compressive force.

18. The binder of claim 17 wherein said ring has a minor dimension and a major dimension; said major dimension is at least 1.5 times said minor dimension when said ring is fully relaxed and expanded.

19. The binder of claim 17 wherein said closure is a telescopic interlock closure.

20. The binder of claim 17 further comprising a cover having a ring-crush resister; said ring crush resister positioned adjacent said ring as a physical obstruction within said cover to inhibit permanent deformation of said ring due to excessive compressive force exerted in the direction of said minor diameter of said ring by sharing load of said compressive force with said ring.

21. The binder of claim 17 further comprising a cover having effectively a primary cover fold when said cover is closed such that said cover has an aesthetically pleasing streamline contour when closed and is ultra thin to save space.

22. The binder of claim 17 wherein said primary cover fold comprises two very close substantially 90-degree folds effectively acting as one substantially 180-degree fold; distance between said 90-degree folds less than half of said minor diameter of said ring.

23. The binder of claim 17 wherein said ring has a flip-top hinge.

24. A loose-leaf binder comprising:

a plurality of oblong binder rings that are each closable from an open position via an interlock closure;

a connective element having at least one pivot coinciding with a main axis of rotation of said oblong binder rings;

said connective element joining together and aligning said oblong binder rings along said main axis of rotation;

each of said oblong binder rings has a major diameter, a minor diameter and a perimeter when closed;

said main axis perpendicularly intersecting each of said oblong binder rings approximately at an intersection of said minor diameter and said perimeter of each of said oblong binder rings and defining an upright ring position when said minor diameter is substantially vertical and said main axis disposed approximately at lower end of said minor diameter;

said pivot perpendicularly attached to at least a ring one of said oblong binder rings at a roughly straight or gradually curved bottom portion thereof providing a fairly stable base;

said bottom portion always remaining roughly straight or gradually curved whenever said ring one is closed and is subject to normal usage thereby resisting abrupt flopping of said ring one toward either side of said pivot when said ring one is situated in said upright ring position;

said oblong binders maintain an oblong shape whenever closed such that said major diameter is always at least 1.5 times longer than said minor diameter whenever said oblong binder rings are closed and are subject to normal usage;

said pivot is sufficiently thin to be disposed in a conduit of a prospective cover enabling said pivot to be axially located relative to opposing rotations of said prospective cover and said oblong binder rings while said oblong binder rings remain closed;

whereby arrangement of said pivot with said oblong binder rings facilitates rotational attachment of said oblong binder rings to a suitable flatly-foldable extra-thin cover, saving storage space when said extra-thin cover is closed, enabling good page-turning of ring-bound loose-leaves when said extra-thin cover is open 180 degrees, enabling ring-bound loose-leaves to stack substantially flat above and below said pivot when said extra-thin cover is flatly open 360 degrees.

25. The binder of claim 24 wherein

each of said oblong binder rings has roughly-vertical column-like stiff portions when situated in said upright ring position;

each of said oblong binder rings has a roughly-horizontal bow-like flexible upper portion when situated in said upright ring position;

each of said oblong binder rings has a roughly-horizontal lower portion when situated in said upright ring position;

each of said oblong binder rings is reversibly compressible relative to a moderate compressive force roughly exerted in the direction of said minor diameter such that said column-like stiff portions resist permanent buckling while said bow-like flexible upper portions more readily flatten and widen outward to provide much of desired reversible vertical compressibility,

each of said oblong binder rings springs back to resume a relaxed expanded form upon removal of said moderate compressive force.

26. The binder of claim 24 wherein said pivot is a spine, each of said oblong binder rings is attached to said spine, said spine and said oblong binder rings are elements of a skeleton; said skeleton is a single piece of molded plastic.

27. The binder of claim 24, further comprising:

a conduit casing having a conduit;

said pivot disposed within said conduit;

each of said oblong binder rings rotatable relative to said conduit;

said conduit casing is made of a sheet of material and has a wrapping portion defining said conduit and a substantially planar portion, thickness of said sheet when said wrapping portion is unwrapped is less than diameter of said conduit;

said planar portion for attaching said conduit casing to a complementary cover portion;

whereby a subassembly can be manufactured independently of said complementary cover portion to facilitate efficiencies in component manufacturing, packaging, distribution and assembly.

28. The binder of claim 24, further comprising:

a cover having a conduit casing and a complementary cover portion;

said conduit casing having a conduit and said complementary cover portion having an edge-fold;

said pivot disposed within said conduit and each of said oblong binder rings rotatable relative to said conduit;

said conduit casing has a wrapping portion and a substantially planar portion; said wrapping portion defines said conduit and said planar portion for fastening said conduit casing to said complementary cover portion;

said wrapping portion is made of a sheet of material of substantially uniform thickness when flatly unwrapped;

said conduit casing is parallel and proximate to said edge-fold;

said complementary cover portion can be folded open 360 degrees in a flat formation along said edge-fold such that said wrapping portion overhangs said edge-fold.

29. The binder of claim **24** wherein said connective element is rigidly joined to said pivot prohibiting rotation of said connective element relative to said pivot; said ring one rotatable about said pivot while said pivot remains motionless; said connective element having a planer portion for attaching said connective element to a complementary cover portion.

30. The binder of claim **24** wherein said interlock closure is a telescopic interlock closure; said telescopic interlock closure provides substantial reversible extension or contraction of said minor diameter of each of said oblong binder rings to improve page-turning of ring-bound loose-leaves when extended and to save space when contracted.

* * * * *

CERTIFICATE OF SERVICE

I hereby certify that I filed the foregoing Non-Confidential Opening Brief of Appellant James S. Chizmar with the Clerk of the United States Court of Appeals for the Federal Circuit via the CM/ECF system this 10th day of August, 2015, and served a copy on counsel of record by the CM/ECF system and by electronic mail to the parties below.

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CERTIFICATE OF COMPLIANCE

Pursuant to Fed. R. App. P. 32(a)(7)(C), the undersigned hereby certifies that this brief complies with the type-volume limitation of Fed. R. App. P. 32(a)(7)(B)(i).

1. Exclusive of the exempted portions of the brief, as provided in Fed. R. App. P. 32(a)(7)(B), the brief contains 13,812 words.

2. The brief has been prepared in proportionally spaced typeface using Microsoft Word 2011 in 14 point Times New Roman font. As permitted by Fed. R. App. P. 32(a)(7)(B), the undersigned has relied upon the word count feature of this word processing system in preparing this certificate.

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